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ENGINEERING FINANCE COMMERCE

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in Nanking and Canton

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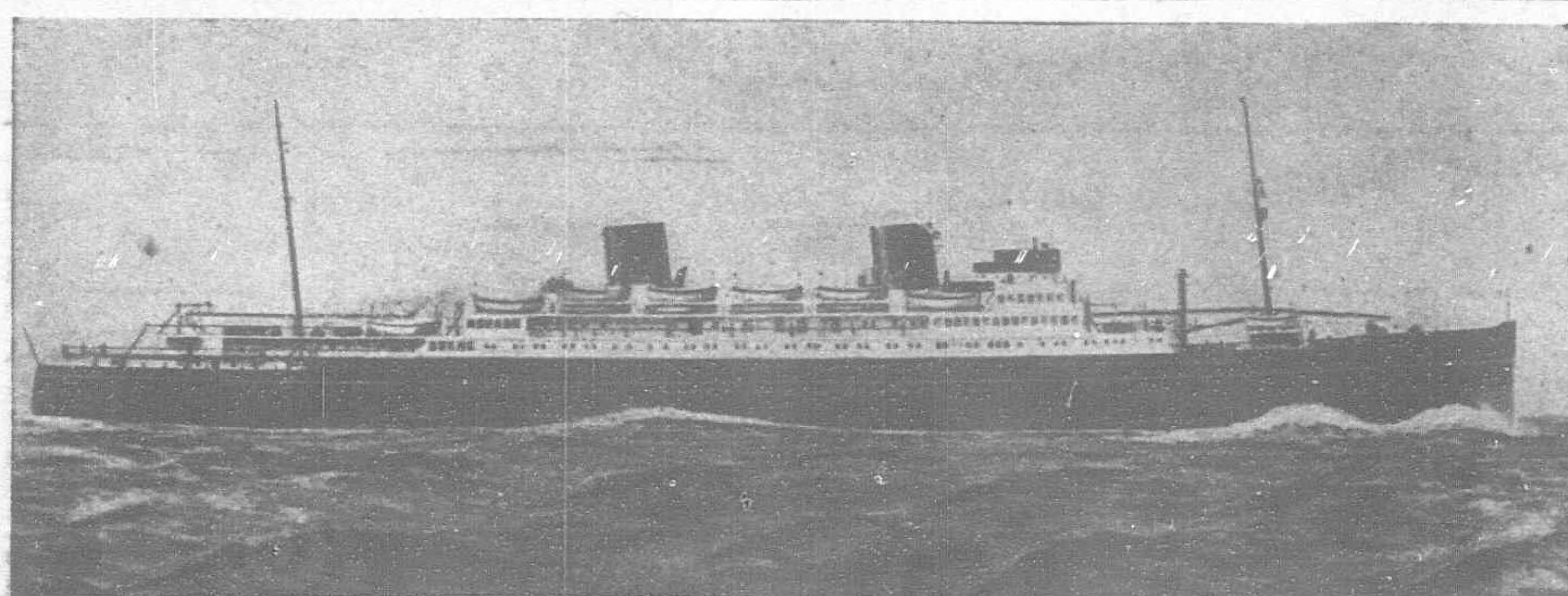
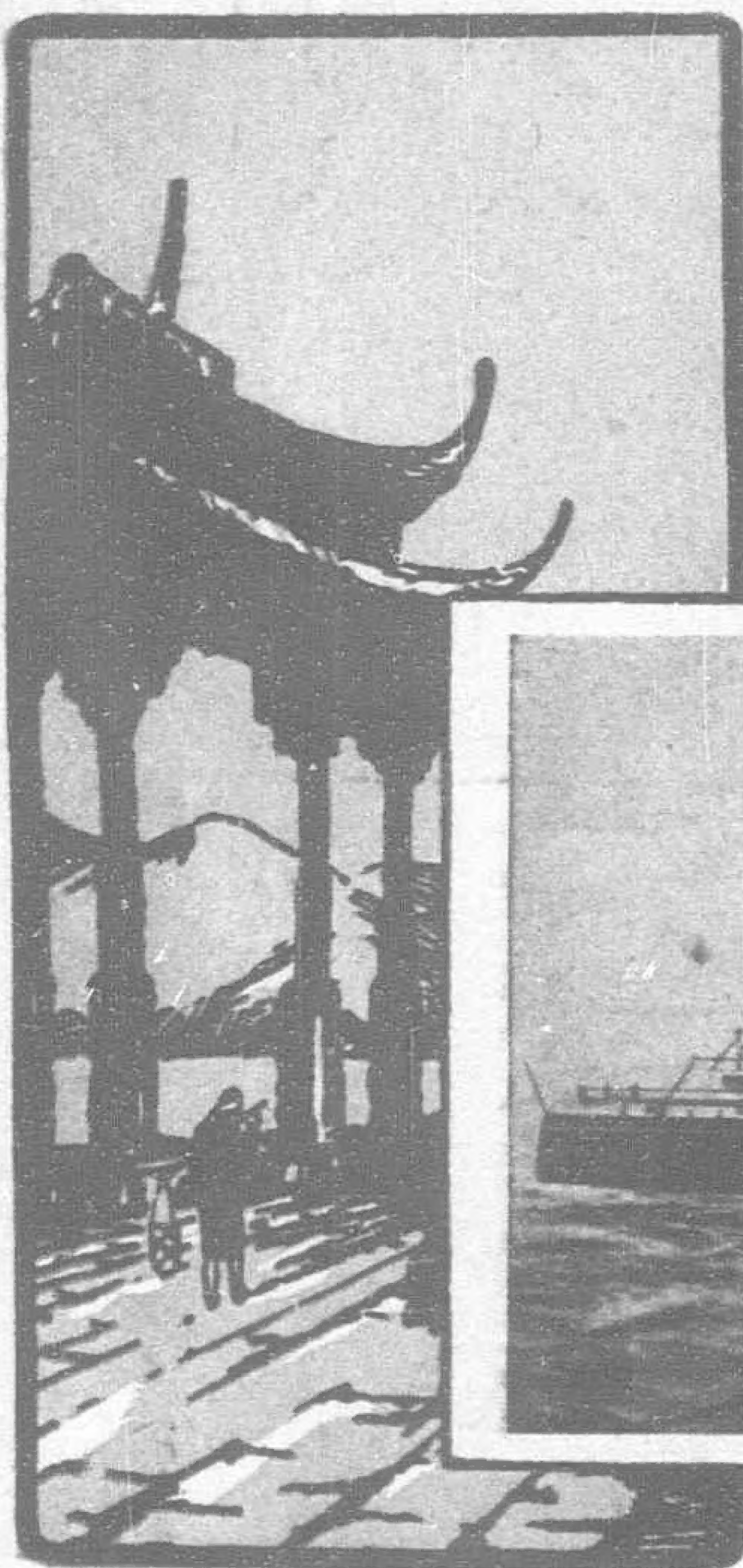
遠東時報

Vol. XXV March, 1929 No. 3

SHANGHAI, PEKING, TOKYO AND MANILA



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# The Far Eastern Review

ENGINEERING

FINANCE

COMMERCE

VOL. XXV

SHANGHAI, MARCH, 1929

No. 3

## Memorials to Dr. Sun Yat-sen in Nanking and Canton

By Y. C. Lu

Architect to the Sun Yat-sen Memorial

IN commemoration of the noble aspirations and heroic deeds of Dr. Sun Yat-sen, father of the Chinese Republic and to keep alive in the minds of the present and future generations of four hundred millions of Chinese the ideals and principles which he had laid down for the salvation and remaking of the Chinese nation, it is highly fitting that great significance should be attached to the erection of memorials and monuments to Dr. Sun's memory in all parts of China and especially to the building of Dr. Sun's mausoleum on Purple Hill in Nanking, a spot strongly cherished by Dr. Sun himself during his life time. When in 1924 the remains of Dr. Sun Yat-sen were being placed in the five pagodas of Pi-Yun-Sze in the Western Hills near Peiping, the Committee on Dr. Sun's Tomb Construction was formed of prominent Kuomintang members. In April of that year a vast tract of land was secured on Purple Hill near the Tomb of the Founder of the Ming Dynasty. In May an open competition was called for the design of a Memorial Hall and Tomb for Dr. Sun Yat-sen in which about forty participants both Chinese and foreign were entered. The competition was closed in September and prizes and honorable mentions were awarded. The first prize design was decided upon to be executed and its winner was chosen as architect of the works.

### Progress Impeded

The construction of the first part of the works consisting of the Memorial Hall and Tomb was commenced January 1926, and was scheduled to be completed in a little more than a year's time. The corner stone was laid on March 12, the first anniversary of Dr. Sun's death. The progress of the work was seriously impeded as it was several times affected by the Revolutionary war when it reached the area of Nanking, but was never entirely stopped. At present it is the gratifying expectation that the Memorial Hall and Tomb has been completed

and the Burial Ceremony will take place March 12, the fourth anniversary of Dr. Sun's death.\*

### Remaining Structures

Other structures which will complete the mausoleum consist of a Tablet Pavilion, an Entrance Gate, a Pailo, boundary walls and a causeway and flights of steps, beside minor accessory buildings used for the maintenance and care of the building and landscape work of the mausoleum.

The plans and working drawings for these structures have been prepared and this remaining part of the work expected to start sometime this spring.

### Estimated Total Cost

The expenses for the construction was to be borne by the National treasury but the greater part has been appropriated from the Canton Government since the founding of the Nationalist Government there in 1926. The total cost will amount to a little over two million dollars when completed.

### The Architect's Aim

In the conception of this design it has been the aim of its architect to recreate in the medium of architecture that character which is Dr. Sun Yat-sen and to interpret in architectural form the spirit and ideals of Dr. Sun which seeks to embody the highest of the philosophical thought of ancient China into the practical solution of life problems of the human race by methods developed through modern scientific researches. Hence in the design of this mausoleum the fundamental ideas are in accordance with Chinese traditions both in planning and in the form. By its architecturic qualities it seeks to express the character



Dr. Sun Yat-sen

\*This ceremony has been postponed to June.—Ed.



and ideals of Dr. Sun as outlined above. The adherence to tradition of the temple idea in the mausoleum is not strictly slavish and is in spirit only. It should be apparent in its Chinese origin, yet, must stand out distinctly as a creative effort in monumental construction of modern times.

The Architectural problem of planning of the mausoleum proper consists in combining the Memorial Hall to the Tomb which is to be made accessible from the former. The Tomb, viewed from outside looks just like one of its kind to be found in China, but the interior is so arranged that the sarcophagus can be viewed from around a balustrade like that of Grant's Tomb in New York or Napoleon's Tomb in Paris.

The design of the Memorial Hall is an attempt at translating or rather developing Chinese architecture from wood to stone and concrete; at the same time achieving the distinctive character of a mausoleum. This translation applies to the ornamentation as well as to the principles of construction. The Hall will serve its purpose as one of its kind in China but is also to house a sitting statue of Dr. Sun Yat-sen similar to that of the Lincoln Memorial in Washington. Its dimensions are 72 by 92 feet in plan and about 80 feet high to the roof ridge.

### An Ideal Site

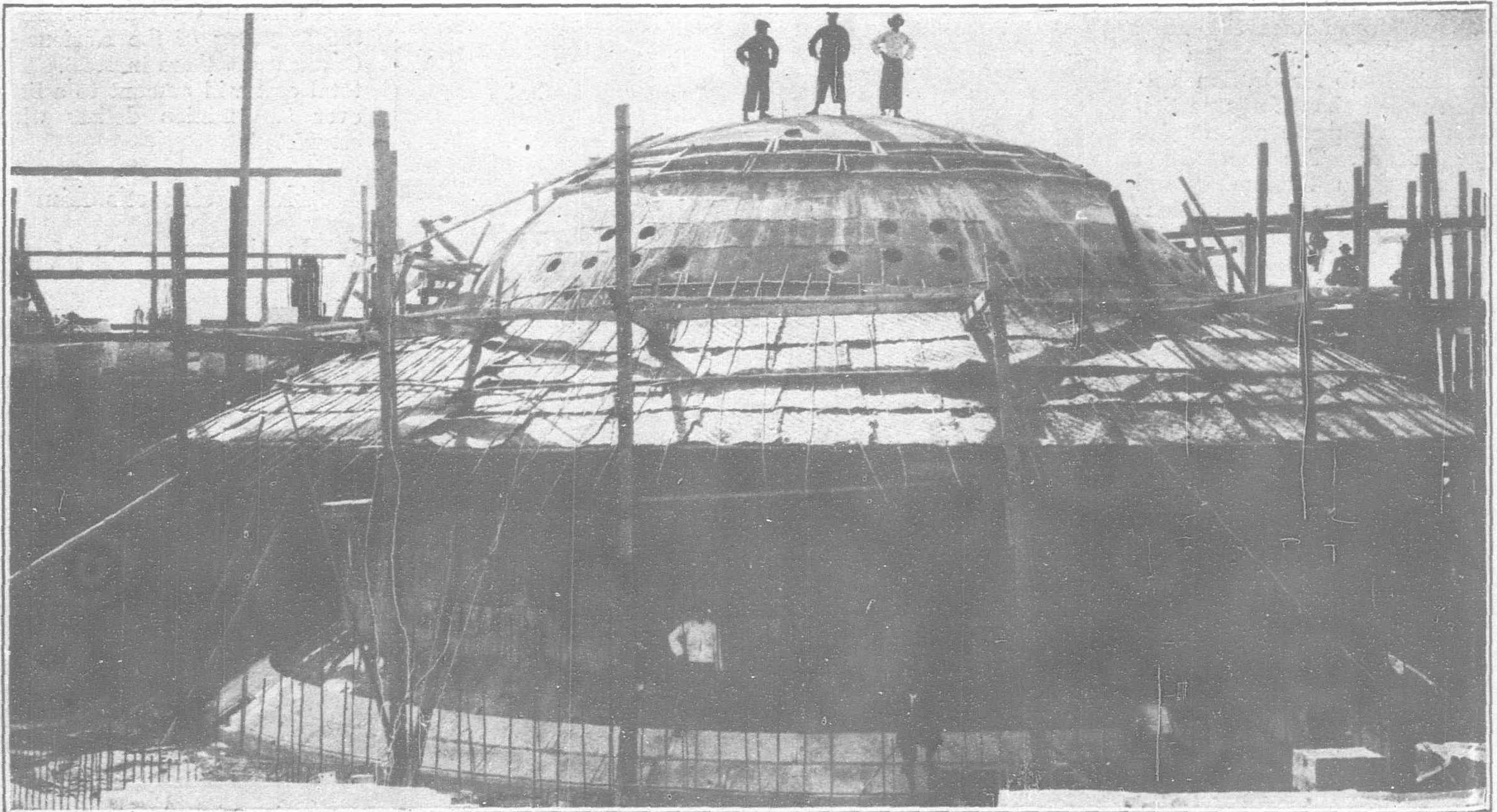
The site chosen is an ideal one. It is almost in the exact



Y. C. Lu, Architect of Dr. Sun's Mausoleum in Nanking and Memorial Hall in Canton

center of Purple Hill. The Mausoleum is erected on a knoll on the sloping side of the hill. This knoll is arranged as a terrace which commands a complete view of the city of Nanking to the south and east. In developing the grounds on the hill slope it took on most naturally the shape of a huge bell with the Mausoleum at its top which may be seen at a distance of miles. The approach consists of an immediate stretch of straight paved causeway 1,200 feet long to be lined with rows of cypresses and three roads of two miles long each of winding driveway along the rolling countryside before it joins the main road from the city. From these drive-ways views of the Mausoleum at different angles and through varied vistas are to be gained as one makes the approach. The adjoining country including the hill-sides is being planned out as a national park of a large scale.

The method of construction although modern can be said to be purely Chinese in idea; it consists of a skeleton of reinforced concrete filled in with walls of brick and stone very much similar to Chinese system of posts and beams. The Tomb is in the form of a dome of double shell of reinforced concrete also faced with granite. In a way it is to be regretted that, owing to the restriction of funds and limitation of the time for its completion, this structure can not be built of solid masonry throughout, in which



View of the Tomb After Concreted, Dr. Sun Yat-sen's Mausoleum (Taken November 1927)



case it would become an adaptation of western construction to Chinese architecture—which is more desirable from an architectural point of view. The invention of reinforced concrete is but recent and its quality of permanence is still to be seen. In this building an effort is made to protect all reinforced concrete work from the outside and it may be said that it will be the most permanent structure that has ever been built in China.

### Enduring Materials

All materials are selected with a view to their lasting quality. The Hall and the Tomb will be faced with Kowloon granite; all other stone work will also be of granite. The roofing tiles as originally proposed are to be of bronze, but as this was thought

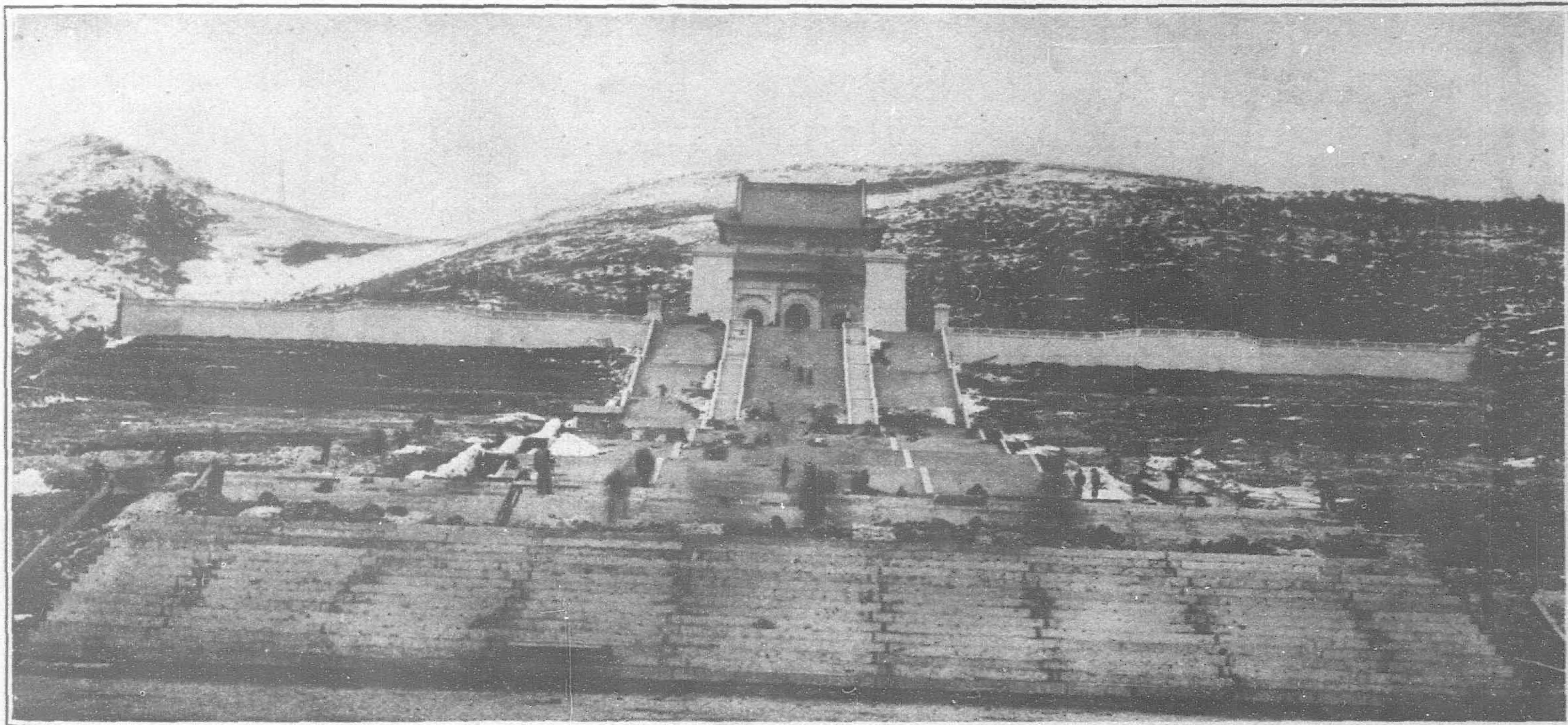
too extravagant, glazed tiles has been used instead. The interior finish will be in granite marble and artificial stone. The ornamental part in ceiling and beams will be done in mosaic, no painting being used anywhere. Windows and doors are all made of bronze.

In the design of this work the aim has been to develop Chinese architecture according to the principles of aesthetics and it is neither the adapting of Chinese forms to modern construction nor *vice versa*. An original composition is striven for but always with a feeling for and in the spirit of Chinese ideals gathered through the study of the best existing examples.

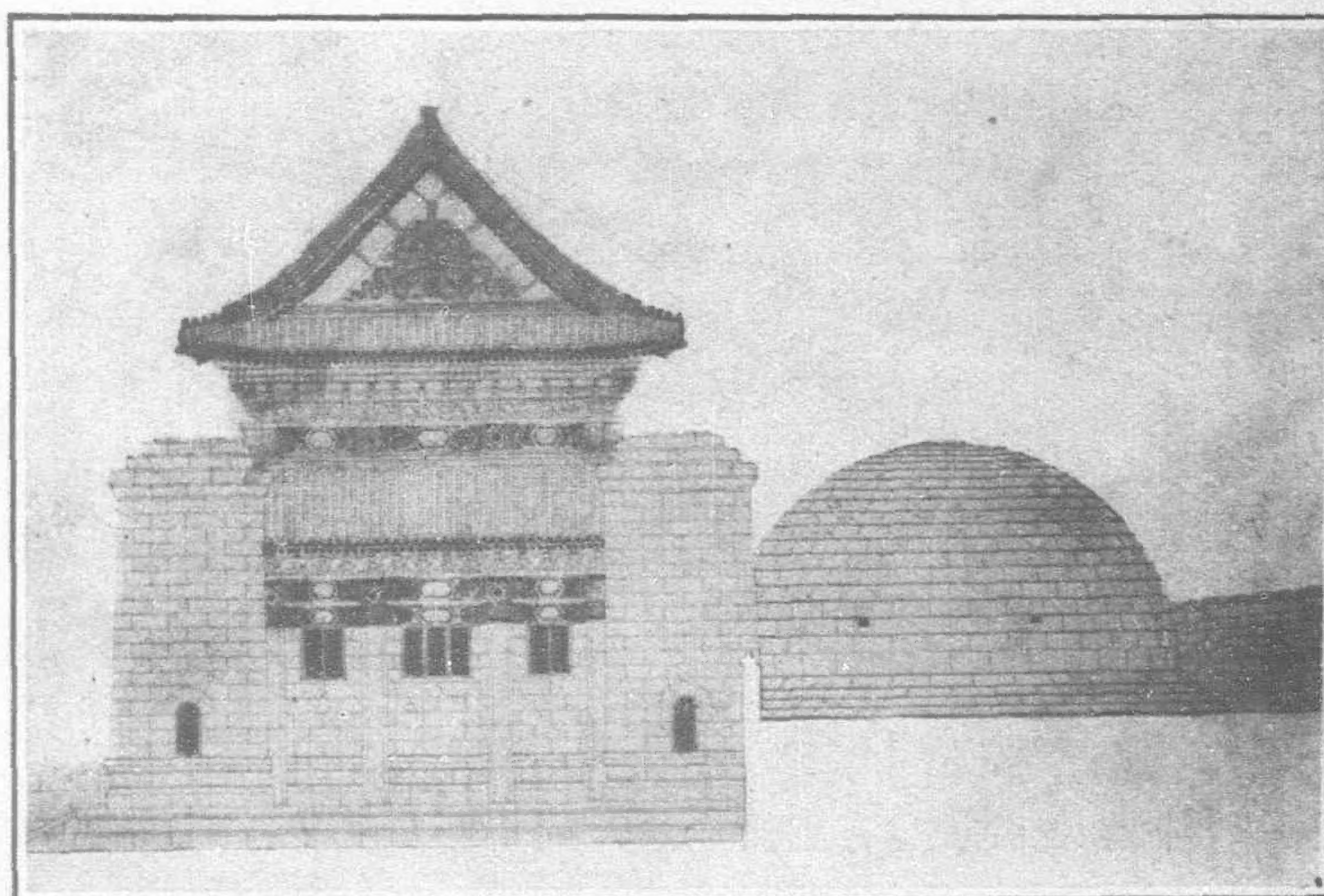
Soon after the Nationalist Government was first inaugurated in Canton in 1926, it voted for the building of a



Side View of the Mausoleum



General Front View of Dr. Sun Yat-sen's Mausoleum (Taken February 1929)

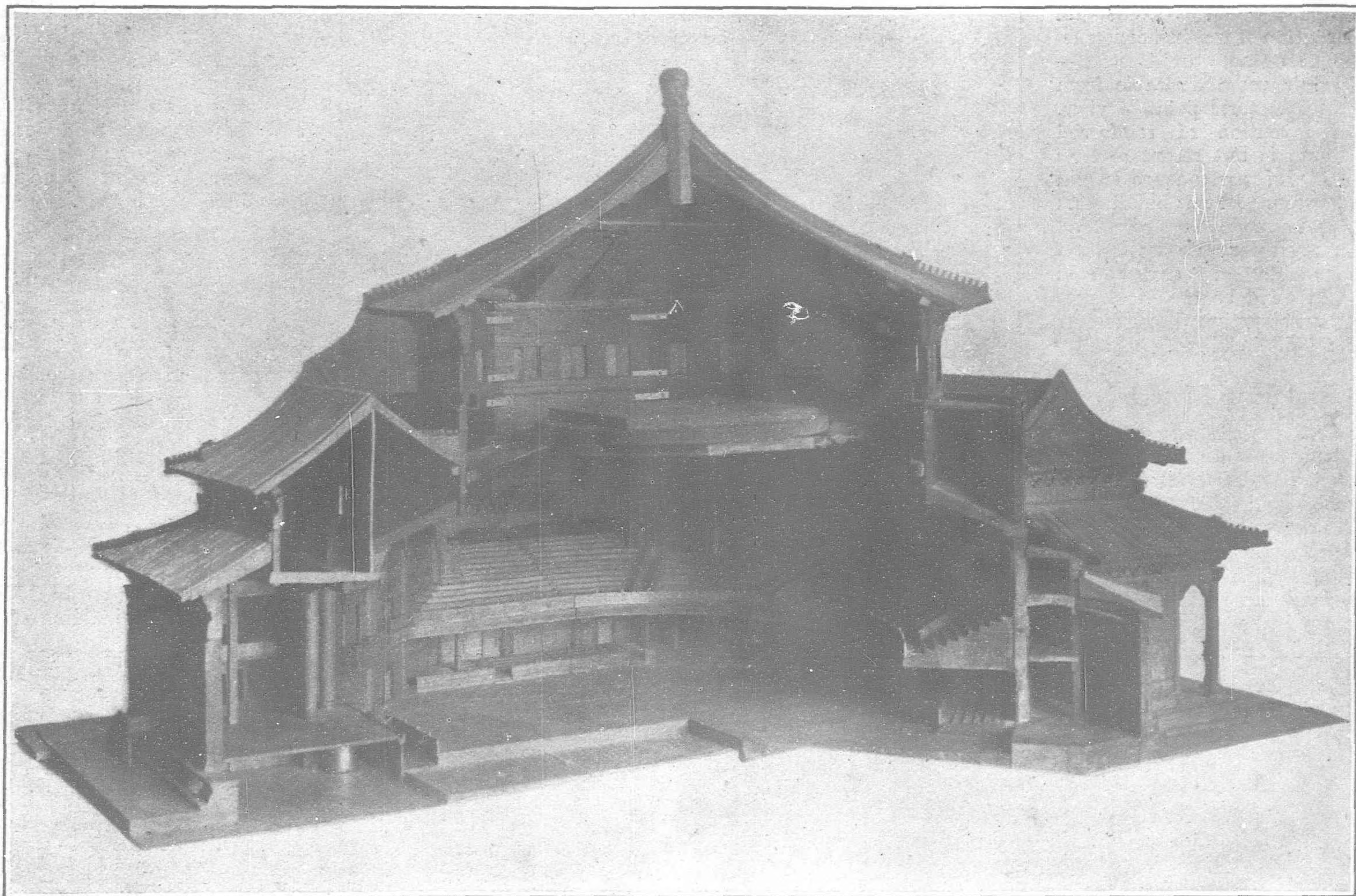


Drawing of Side View of Dr. Sun Yat-sen's Mausoleum

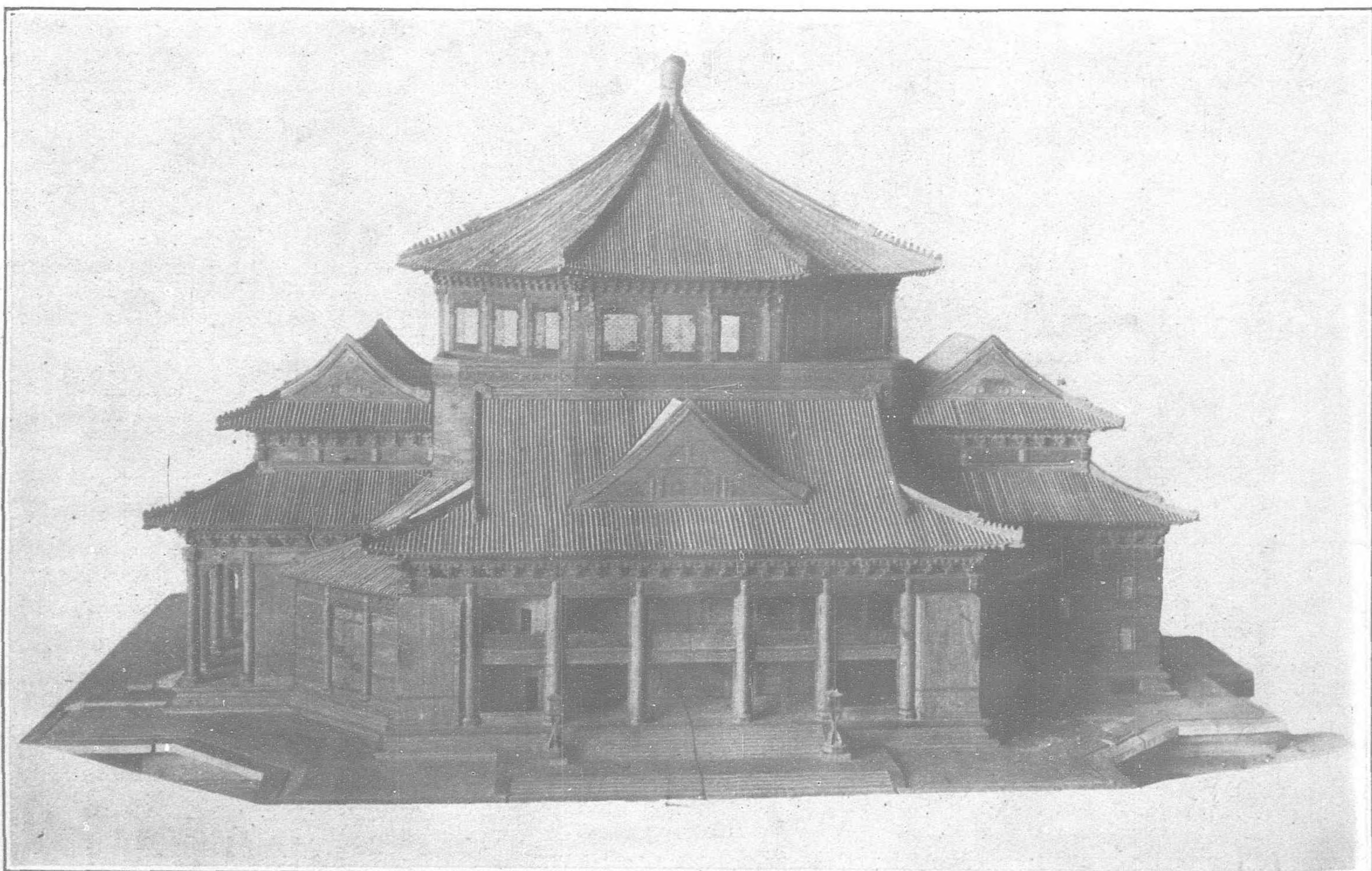
The "Far Eastern Review" learns with regret that Mr. Lu, who was only 26 years old, died of an incurable disease as this article went to press. Mr. Lu was one

of China's most promising artists, having studied in Europe and America. His loss is mourned by all who knew him.



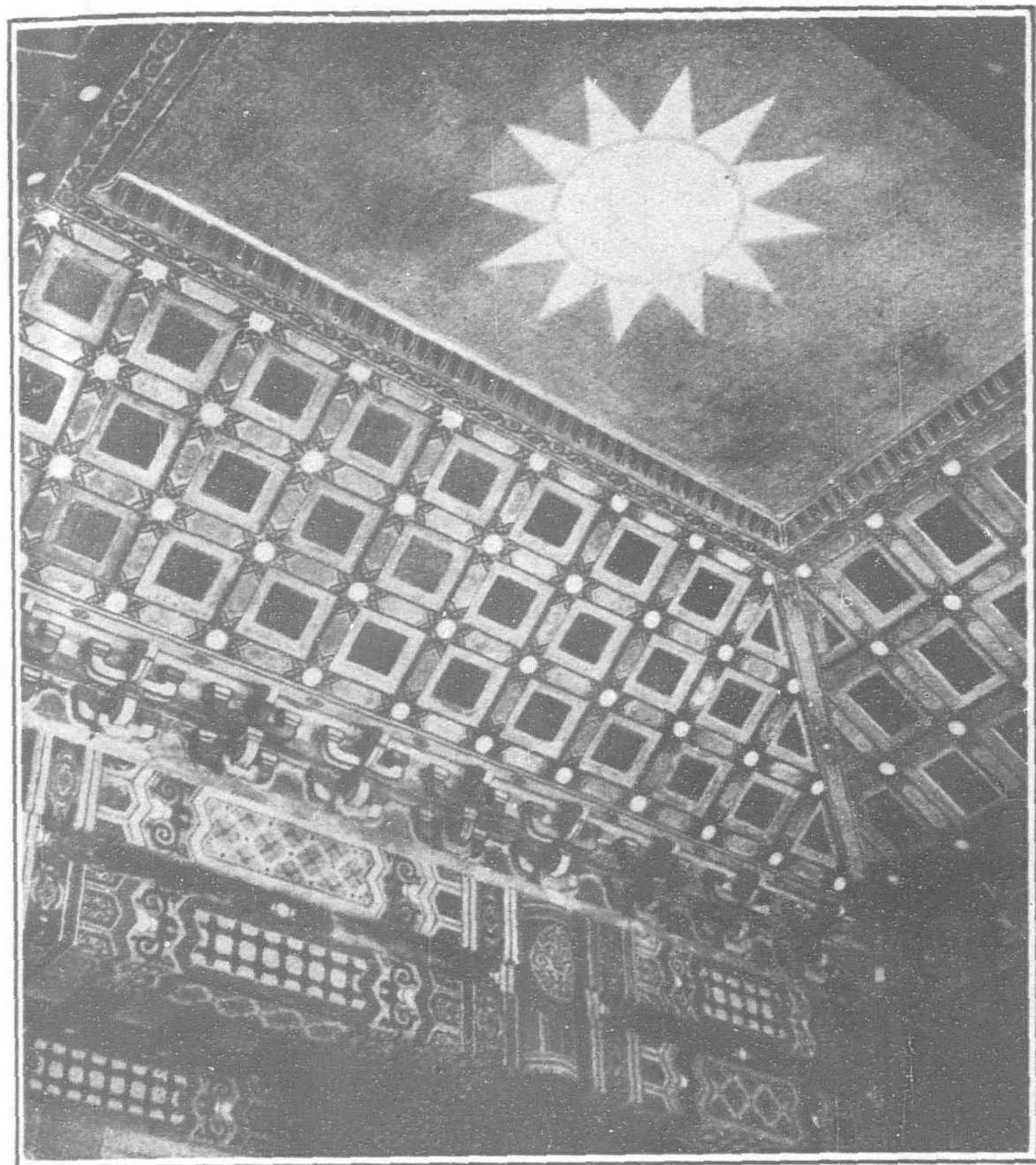


Wooden Model, Interior of Dr. Sun Yat-sen Memorial Auditorium, Canton

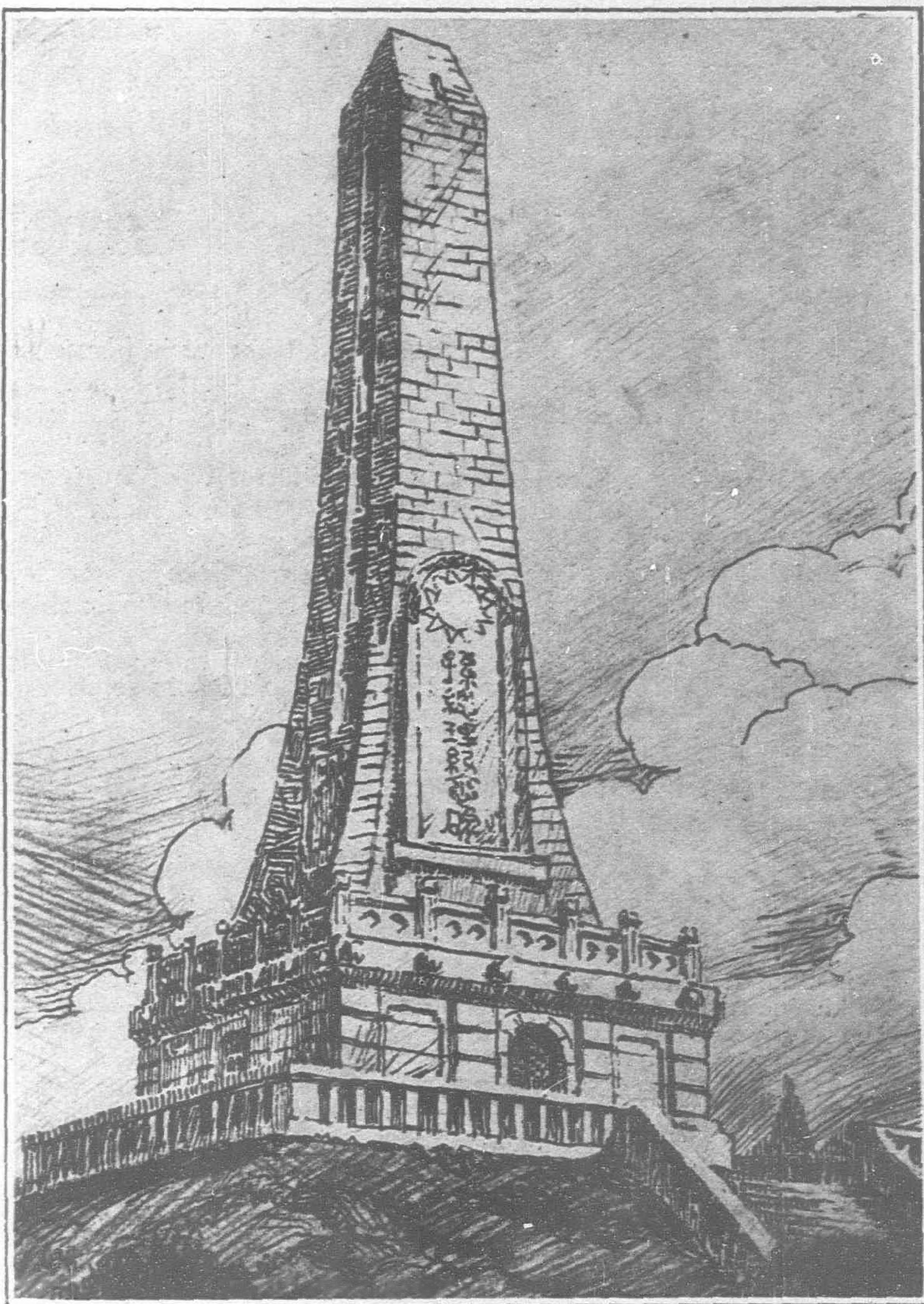


Wooden Model, Side View of Dr. Sun Yat-sen Memorial Auditorium, Canton





Interior View of Memorial Hall Ceiling Dr. Sun Yat-sen's Mausoleum



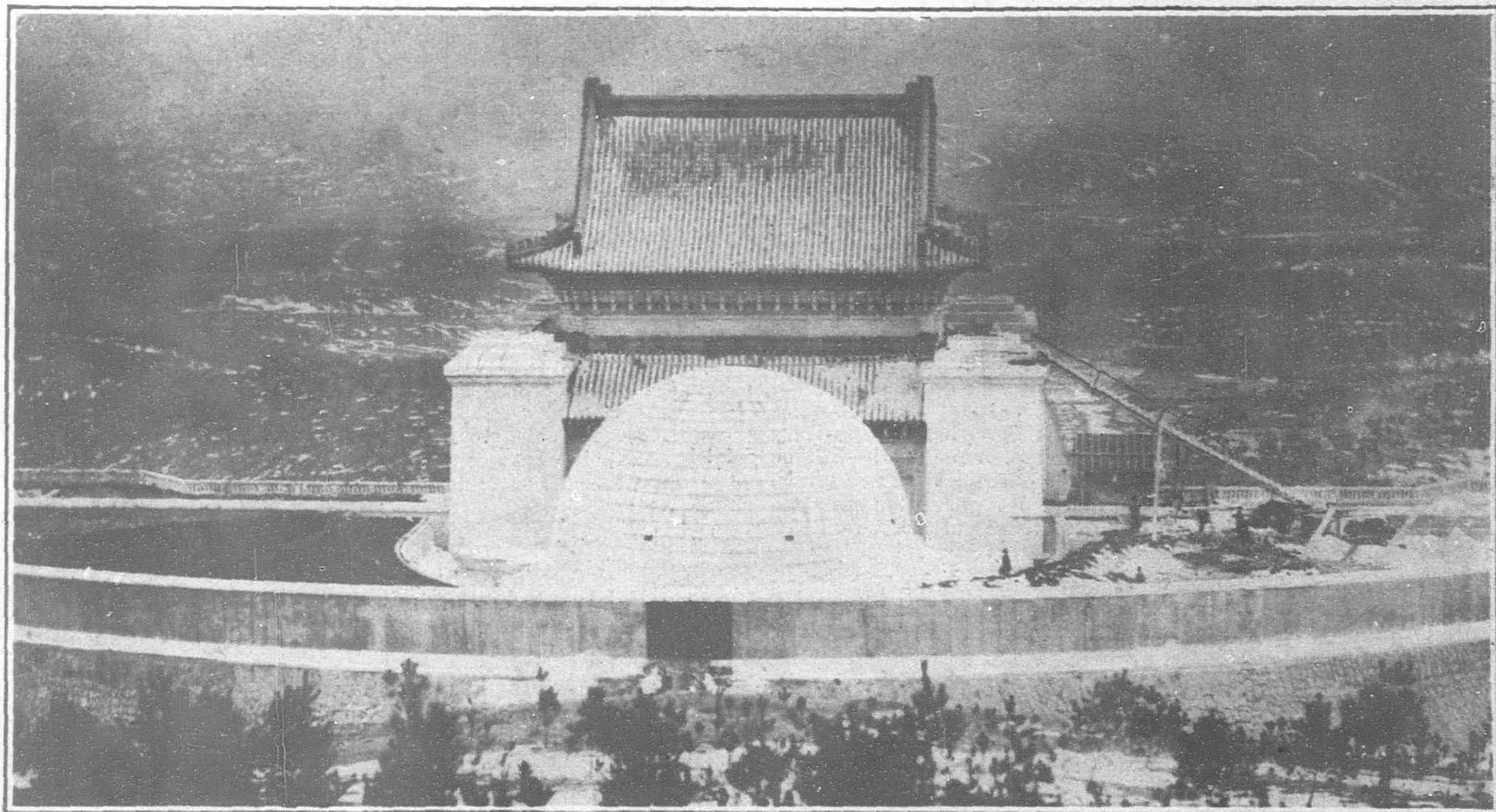
The Memorial Monument to Dr. Sun Yat-sen, Goddess of Mercy Hill, Canton

Memorial Hall and Monument to Dr. Sun Yat-sen in the city of Canton. The architect for Dr. Sun's Mausoleum was made also architect of these two works after a competition. The work of construction of both was started in the spring of 1928 and the buildings are expected to be completed in about two years. The total cost of both will amount to over two million dollars.

### Designed in Chinese Style

The Memorial Auditorium being the largest structure of its kind in the Orient is also designed in Chinese style; it is a combination of steel and concrete construction with a seating capacity for five thousand people. All modern installations including full acoustic treatment will be made. Dimensions of the building are 210 by 240 feet in plan and 160 feet in height. The building

is on the site of former Presidential Yamen occupied by Dr. Sun Yat-sen in 1924. The Monument is being erected on top of Kuan Yin Hill (Goddess of Mercy Hill) directly behind the Auditorium. It will be constructed entirely of granite to a height of 120 feet and will command a complete view of the city of Canton and its environment.



Back View of Dr. Sun Yat-sen's Mausoleum



# Taels 81,000,000\* of Confidence in Shanghai

**C**ONFIDENCE in the International Settlement in Shanghai was never more evident than in the recent bidding for the purchase of the Shanghai Municipal Electricity Plant. There were three bidders, two British and one American. The American Group is really of an international character, representing British and other interests. The bids submitted by the three groups follow:—

The three Groups who submitted tenders to the Electricity Special Committee (1929) based upon the Memorandum of Franchise were:—

THE HON. R. D. DENMAN, representing, Lord Meston's Group.

BRITISH TRUSTS ASSOCIATION, LIMITED.

AMERICAN AND FOREIGN POWER COMPANY, INC.

## The Tenders

The following offers were made:—

The Hon. R. D. Denman's offer for leasing:—

"In brief the scheme is that a S. M. E. Company lease the undertaking on terms of paying for the interest and Sinking Fund Instalments on all the Council's Electricity Loans plus a fixed rent of Tls. 2,000,000 per annum. After the payment of a 9 per cent. dividend on the Company's ordinary shares, three-quarters of the surplus profits go to the Council and one-quarter to the Company. A sliding scale of benefits to consumers is included, which operates after 10 per cent. is paid, not on the whole capital of the Company, but on the ordinary shares only."

BRITISH TRUSTS ASSOCIATION, LTD.

Offer (A): Fifty-one million Taels—under the terms and conditions of the Memorandum of Franchise.

Offer (B): £7,200,000. Sterling.—conditional upon certain amendments to paragraphs 8 and 13 of the Committee's Memorandum of Franchise).

Offer (C): An offer to lease on terms to be mutually agreed upon.

AMERICAN AND FOREIGN POWER COMPANY, INC.

*Eighty-one million Taels—under the terms and conditions of the Memorandum of Franchise.*

## Memorandum

The following is the memorandum covering the principal features of the proposed franchise issued by the Electricity Special Committee for guidance only.

### PROPOSED SALE OF THE ELECTRICITY UNDERTAKING OF THE SHANGHAI MUNICIPAL COUNCIL

(1) **Monopoly:** The Franchise would comprise a monopoly for the generation distribution and sale of electricity, together with the ancillary business associated with an electricity public utility undertaking such as hiring and-or hire purchase to consumers of electricity consuming appliances—including motors, meters, cookers, etc., etc.—to a company operating within the International Settlement area of Shanghai North of the Yangkingpang, to be granted by the Shanghai Municipal Council (which latter expression shall be held to include its successors and assigns), and also on such supplies to outside areas at present served by the said Council's existing municipal roads, subject to the proviso that the said monopoly on Council's extra-Settlement areas and-or roads will be granted on the same general terms as those under which the other public utility companies in Shanghai at present operate, and such monopoly will be dependent upon the Council's tenure of such extra-Settlement roads. In this latter connection the Council can give no guarantee of extra-Settlement monopoly should the ownership of these particular roads be changed to any other governing authority.

(2) **Period of Franchise, Option to Repurchase, and Valuation:** The Franchise referred to in Clause (1) would be granted to the operating company in perpetuity, subject to the provisos hereinafter referred to, which are as follows:

(a) The Council reserves the option to repurchase the Electricity Undertaking at a valuation upon the expiry of 40 (forty) years from the date of purchase subject to giving two years' previous notice in writing to the company of its intention to exercise such option.

(b) In the event of the Council not exercising its option to repurchase at the end of the said period of 40 (forty) years referred to in Clause 2 (a) it would further reserve the option to repurchase the said Undertaking at each and every 10 (ten) yearly period after the aforementioned 40 (forty) years, subject to two years' previous notice in writing being given to the Company.

(c) In the event of the Council at any time exercising the options provided for under subsections (a) and (b) hereof, the valuation for the purpose or repurchase shall be made on the basis of the tenderer's purchase offer and in gold currency.

(3) **Sale of Fittings, etc.:** The operating company would require to agree that the sale of electric fittings and-or other electrical apparatus, electric wiring and-or any work of such a nature would not be undertaken directly or indirectly by them except wiring for power motors, cooking and water heating. The effect of this proviso entails that the company would require to adhere to the same lines of procedure in this connection as at present followed and recognized by the Electricity Department.

(4) **Royalty to Council, etc.:** In consideration of the monopoly which it is proposed to grant to an operating company, the Council stipulates and makes it a condition of granting such a monopoly, that the operating company guarantees to its satisfaction that the Council and the Shanghai community in general shall not be worse off in any way in regard to the supply of electricity than under the present system of management. In addition the Council would require and makes it a condition in regard to granting the said monopoly, that the Company guarantees to pay to the Council in Shanghai Taels by way of Royalty, and without reservations of any nature, an annual sum equal to 5 per cent. of the money value of the total gross sales of electricity debited to consumers during each and every year the said proposed Franchise may be in operation.

(5) **Depreciation Reserve:** It is not proposed to bind the Company to adhere to fixed rates of Depreciation on the plant, etc., but at the same time it is considered that the Company should provide what in its opinion would be "adequate" depreciation reserve; in addition it would be understood that the Company would at all times maintain the plant and properties in an efficient operating condition.

(6) **General Reserve:** It is considered that the Company would require to create (and subsequently maintain) a general Reserve Account not exceeding a maximum of 5 per cent. calculated on the average total capital expenditure account of the three preceding years, subject to the proviso that not more than a sum equivalent to one half of one per cent. be credited to such general Reserve Account in respect of any one year's working. The "total capital expenditure" for this purpose shall be considered to include all payments made up to the end of any financial year on capital account irrespective of whether any items of plant upon which payment or payments may have been made up to the close of such financial year have been placed into working commission or not.

(7) **Dividend Equalization Reserve and Definition of "Total Capital":** It is proposed that the Company create and maintain a Dividend Equalization Reserve Account over a period of years, to be computed at a rate not exceeding 1 per cent. per annum of the total capital of the Company. The total of this reserve shall not exceed 5 per cent. of the capital invested in the business. For the purpose of this Clause and for all such other general purposes the "total capital" shall be defined as including "Share and-or loan capital."

(8) **Proportion of Nett Profits for Reduction of Charges:** If and-or after the nett profit of the Company in any one year shall exceed a nett return of 10 per cent. calculated on the total capital invested in the business of the Company at the end of any financial year, then the Company will be required to allocate one half of any such surplus in excess of the said 10 per cent. to a "Consumers' Reserve Account" for the specific purpose of reducing rates of charge for electricity to consumers. Subject to this proviso it is not the intention to insert any other clause restricting profits.

(9) **Bad Debts, if any:** It is agreed that any sum which the Company may require to write off during the first year after taking over as irrecoverable in respect of accounts outstanding for any year or years prior to the date of purchasing the Electricity Undertaking, shall be for the Council's account.

(10) **Consumers' Deposits:** (a) **Cash Deposits:** It is necessary to point out that cash deposits held from consumers in respect of electricity supplies amount to approximately Tls. 1,705,000 at December 31, 1928.

(b) **Guarantees—Bulk Supplies, etc.:** The nominal value of Shanghai Municipal Debentures at present held by the Electricity Department in connection with large power supplies is Tls. 1,037,800. It is not considered any difficulty would be experienced in transferring these guarantees to the Company.

\*About Gold \$50,000,000.



Leaves, etc.: The Company will be granted all the privileges at present enjoyed by the Electricity Department including:—

(a) The right to break up roads and-or to construct such works as are necessary in connection with the supply of electricity, both underground and above ground, in and on the streets and in all public places within the areas as defined in Clause (1).

(b) The right to enter into any house and-or premises supplied or to be supplied with electricity by the Company for the purpose of inspection, measurement, and for such repairs as are necessary or customary.

(c) In such cases as the Company requires to move poles, overhead or underground cables, buildings, or any other apparatus being the property of the Company, for its own purpose, the cost of such work would be carried out at the expense and entire risk of the Company. In the event of any such works being carried out to the request or instruction and to suit the convenience of the Council or any other party than the Company then the Council or such other party would require to bear the cost of executing such works.

(12) Tariffs: Maximum Rates: Subject to the provisions contained in Clause (13) the present printed schedule detailing the current rates of charge for all ordinary electricity supply purposes shall be defined as the maximum rates of charge, and similarly all present agreements covering bulk supplies of electricity to consumers shall remain operative during the currency of such agreements subject to the proviso that the all-in rate per kilowatt hour for the combined Capital Charge and basic

or administrative acts of a Government and or Public Authority, or any direct and-or unavoidable influence—other than over-capitalization by the Company:

then the Company under and or all of such circumstances shall be entitled to increase the tariffs, but only to such an extent as would restore the Company's profit to the predetermined figure, and always subject to the proviso that any or all of such changes in tariffs shall at all times be subject to the previous written consent of the Council, it being provided that consideration with a view to such consent shall at all times be given by the Council without unreasonable delay.

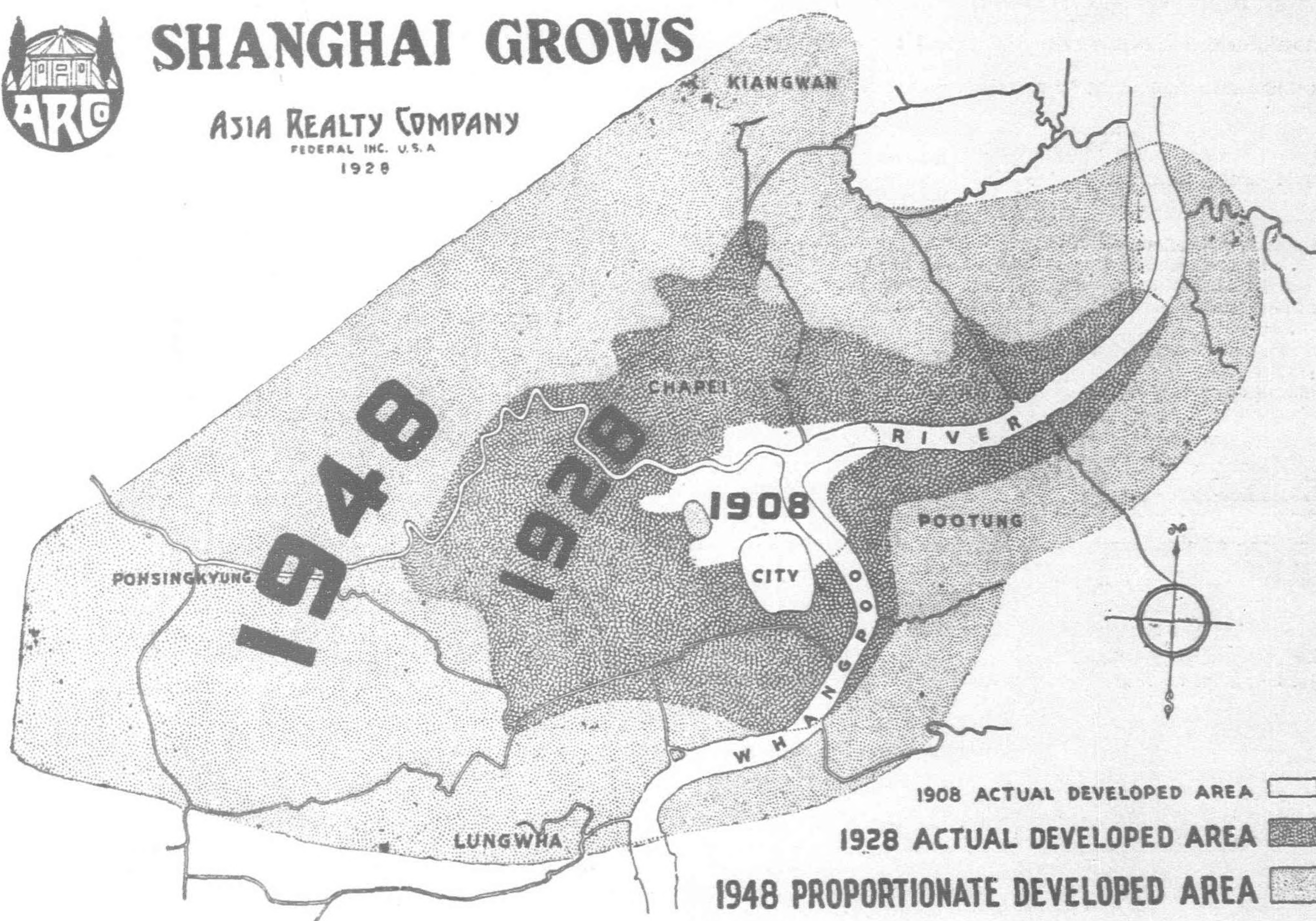
(14) Staff: The Company would be required to take over in full all the Council's obligations in regard to the staff of the Electricity Department, both foreign and Chinese, and including superannuation, pension, and all other benefits and privileges. Furthermore the Company would be obliged to enter into an undertaking to retain the members of the existing staff, and not dismiss any except for such reasons as would now apply, viz: inefficiency, neglect of duties or other causes as defined in the Council's present form of Agreement. In this connection it is necessary that the staff should have the assurance that their prospects in regard to remuneration promotion and length of service will not be jeopardized or adversely affected in the event of them transferring their service to the Company.

(15) Rates and Taxes: It is agreed that the present basis upon which the Electricity Department is assessed and pays municipal taxa-



## SHANGHAI GROWS

ASIA REALTY COMPANY  
FEDERAL INC. U.S.A.  
1928



Running Charge in respect of such bulk supplies shall on renewal of agreement in no case exceed the existing contract rates, except in cases where bulk supply consumers may have already been notified by the Electricity Department of other renewal terms, or, where previous agreements are being carried on subject to termination at the discretion of the Department, otherwise the present all-in rate per kilowatt hour for the combined Capital Charge and basic Running Charge shall be considered as the maximum charges, subject further to the provision that the basic figures upon which the Running Charge is made up may subsequently be reduced if improved methods in the generation and distribution of electrical energy introduce factors which may involve amendment of the basic principle upon which the said Running Charge is at present framed and adjusted, and always subject to the provisions contained in Clause (13).

(13) Tariffs: Provisions for Amendment: It would be a condition that all consumers of electricity should not have to pay more for electricity for any of the uses to which it is generally or commonly applied, e.g., light, heat, power (industrial and-or traction), with the exceptions that in the event of any and-or all of the following factors being influenced in higher costs to such an extent as to adversely affect the Company's total production costs.—("Production Costs" are to be taken as those charges at present included under this head by the Electricity Dept.)—as follows:—

Cost of plant, buildings, cables or any other materials, fuel, oil, stores, labor, rates and taxes, insurance, depreciated local currency, and additional and-or unavoidable expenses caused by the legislative

tion on its properties shall be retained, that is, no assessment for such purposes shall be made on electric lines, poles, plant, etc. now or in the future—and further that no discrimination shall be made against the Company in respect of the valuation for rating purposes of land and buildings. It is further agreed that in consideration of the Royalty which the Company will require to pay to the Council under the terms of Clause (4) no direct or indirect taxation in any form shall be imposed on the company now or in the future by reason of the Company being a public utility operating concern.

(16) Capitalized Interest: The Company will be permitted to debit capital account with interest on expenditure on plant, until the date same is placed into commission, at a rate not exceeding 6 per cent. per annum.

(17) Rules and Regulations: The Company shall at all times be entitled to make and enforce such rules and regulations covering the terms and conditions of the supply of electricity as may be reasonably considered necessary by the Company, in the same manner as now applies in the case of the Electricity Department.

(18) Council's Electricity Supplies, and re Private Concerns crossing Roads, etc: It is agreed that the Council will purchase from the Company at ordinary tariff rates the whole of its requirements for electricity supply, with the proviso that in the case of bulk supplies the terms will be subject to Clause (12).



The Council will continue the present arrangement whereby any company and-or private party is not permitted to cross roads, etc., with electricity supply mains for the purpose of giving or conveying a supply of electricity.

(19) Technical Matters.—The Council takes the view that a Company operating an electricity public utility business would conduct its affairs, both as regards provision of adequate plant, etc., to meet the growing needs of the community, and in its consumer relationship, on lines similar to those which enabled the Electricity Department to build up its business. In this connection it is desired to specify the more salient features in order to avoid misunderstandings in the future.

(20) Plant Extensions.—There shall be no undue delay by the Company in providing for the extension of the power station or stations, sub-stations and distribution system generally.

(21) Generating Plant Reserve.—The Company shall at all times maintain an adequate reserve or standby capacity of plant in the installed capacity of the power station or stations.

(22) Meter Rentals.—The Company shall not introduce meter rents except for special metering for the consumer's own purposes, as at present.

(23) Service Charges.—The Company shall not increase the service charges at present in force except in very special cases.

(24) Bulk Supplies.—No alteration to the current agreements for bulk supplies of electricity shall be made unless such is to the benefit and advantage of the consumer.

(25) The existing hire service of motors and or other electrical apparatus to consumers shall be retained upon present lines; increases in the present hire charges to be permissible only if the cost of such apparatus is materially advanced. This provision does not however prevent the Company introducing a hire purchase system which might be worked in addition to the aforementioned hire service.

(26) Pressure and Frequency.—The pressure of supply to consumers, and frequency of the system, with limit of pressure variation, to remain as at present with the exception of bulk supply which is always open to special arrangement as between the supply authority and the consumer. In the unlikely event however of the Company wishing to change the pressure of supply such change to be entirely at the cost of the Company and to be executed without loss or inconvenience to the consumer.

(27) Overhead Mains.—Owing to the congested condition of the streets through which the electricity supply overhead mains are carried it should not be allowed to construct overhead mains for pressures exceeding 6600-volts, and this pressure should be permitted only in such thoroughfares as are physically suitable, that is, the system and uses as at present in force should not be exceeded. These provisions shall not however be held to prevent the Company erecting E.H.T. overhead transmission lines from Riverside to various primary sub-stations or from such sub-stations, or for the erection of an E.H.T. belt line around the area of supply, provided there shall be obtained clear wayleaves and that such lines do not constitute a danger to the public or the safe working of other utilities such as telephones, telegraphs, tramways, or other form of transport using overhead conductors, provided always that the consent of the Council or other duly authorized body be first obtained, such consent not to be unreasonably withhold.

(28) Protection as a Public Utility.—The Council will afford the Company protection as a public utility undertaking on the same lines as at present applies to the Electricity Department.

(29) Arbitration.—A clause will be inserted in the Franchise providing for and dispute or difference of opinions between the Council and the Company to be dealt with under the English Arbitration Act 1889.

(30) Definition of Shanghai Taels.—As a safeguard against the possibility of depreciated currency in all cases where the expression "Shanghai Taels" may be mentioned or inferred in the Franchise the following definition will apply, and the basis taken shall be that of the Foreign Bankers' Association in regard to the valuation of the "Shanghai Tael":—

"Shanghai Taels.—If the Shanghai currency tael was a coin it would (like the Rupee or English pound) be 0.91666, i.e. 11.12 fine. Its weight is one Chauping ounce which means 565.65 grains troy or 36.64 grammes. Therefore the Shanghai Sycee tael is represented by a lump of pure silver (1,000 fine) weighing 518.512 grains or 33.597 grammes.

At a meeting of the Foreign Bankers' Association, Shanghai, held on August 23, 1927, it was decided that it would be advisable to make a basis of 518.512 grains troy (or 33.599 grammes) of pure silver (1,000 fine) to be used by all the members of the Association and that all Promissory Notes, loans, agreements and suchlike should contain a clause that payment must be made in Silver on the above-mentioned basis."

(31) Interest Payable by Tenderer.—For the purpose of calculating the amount of interest payable by any successful tenderer from the date of taking over the Electricity Undertaking—that is, from January 1, 1929 to the date payment or payments may be effected, the rate shall be taken at 7% (seven per cent.) per annum.

(32) Date for Tenders and Currency.—Tenders for the purchase of the Electricity Supply Undertaking of the Shanghai Municipal Council must be addressed and delivered in person by the duly authorized representative of the tenderer, to the Electricity Special Committee, at the offices of the Electricity Department, No. 17 Foochow Road, Shanghai, at 5 p.m. on Tuesday, March 19, 1929, and such tenders shall be stated in terms of Shanghai Taels.

(33) Guarantee.—The Electricity Special Committee require and make it a condition that any offer or offers submitted in accordance with Clause (31) must be accompanied by cash or a satisfactory bank guarantee,—at the discretion of the Committee—represented by the sum of £1,000,000 (One million pounds sterling).

(34) Date for taking over.—In the event of the sale of the said Electricity Department being effected to private interests the Committee propose that the purchaser should take over the Department as a running concern with effect from January 1, 1929.

(35) Council's Representation on Board of Company, etc.—The question of the extent to which the Council may require to be represented on the Board of any Company, and arrangements in regard to the right of the Council to appoint duly authorized accountants to examine the accounts, books, and-or records, etc. of the Company, will be defined at a later date.

(36) General Notes.—The Riverside Power Station has an installed plant capacity of 161,000 k.w. Of this total Riverside "A" contains 121,000 k.w. of plant, some of which is not modern in the present day interpretation of the term. It operates at 200-lbs. per square inch steam pressure, and a total steam temperature of 572°F. The remaining 40,000 k.w. of plant in Riverside "B" will be in operation this year. It consists of two 20,000 k.w. turbines designed to operate at 350° steam pressure and final steam temperature of 700° Fah. The boiler plant is also new and laid out on up-to-date lines. Pulverized coal firing has been adopted.

Riverside "A" This section of the plant will in the near future operate at an increased efficiency due to the installation of air preheaters in the boiler house, but this improvement cannot be very marked.

Riverside "B." This new section should show a very marked improvement in efficiency over Station "A" and this influence opens an encouraging and almost certain prospect of lowering the overall production costs on the total output from Riverside.

Estimates recently compiled indicate that Riverside No. 2 power station ought to be in commission towards the Autumn of 1932, and that progressive extensions may be expected to bring the installed plant capacity of that station up to 120,000—150,000 k.w. by the end of 1940.

By the introduction of ultra-modern plant in this No. 2 station very much higher efficiencies with consequent lower operating costs should be attained than in Riverside "B."

The Council considers that unless unforeseen circumstances arise, such as an abnormal rise in the cost of plant, import tariff, excessive rates and taxes, much higher cost of coal and other requisites (wages and salaries do not influence largely the cost per k.w. hour generated) there would seem to be no justification for increasing the price of electricity to the consumer. On the contrary, the indications are that a progressive reduction should become possible.

A progressive management would be alive to the possibilities outlined, and would, in order to increase its business and maintain the essential "consumer relationship," pass on some of the economies—lower operating costs—to its consumers.

(37) Authority for issue of Memorandum.—This memorandum has been authorized for issue to the duly accredited representatives of parties interested in the proposed sale of the Electricity Undertaking, by the Committee appointed by the Shanghai Municipal Council, i.e. the "Electricity Special Committee (1929)."

By order of the Committee,

H. GORDON WRIGHT,

Secretary.

The American bid of Taels. 81,000,000 without any conditions, represents the willingness of American investors to put their money into China, where there is a guarantee of law and order and the protection of property. In the International Settlement law and order are guaranteed by the foreign authorities and property is protected under foreign supervision, but the Chinese are participating to a constantly greater extent in the management of the International Settlement. The goodwill represented in this offer is at least 100 per cent. above the physical valuation of the property and indicates a satisfaction that Shanghai will increase in size and population and in wealth.

To the Chinese the fact that an American Group of financiers, with whom are associated British and other financiers, are prepared to put their money into this country, should mean that if in other parts of China there can be stability, law and order, the protection of property, the end to fighting and whimsical taxation, money will be forthcoming for construction purposes. China presents to the bankers of the world almost a virgin market. There are railroads to build, ports to develop, forests to wood, rivers to dredge, industries to create, steamship lines to start and hundreds of enterprises into which the capital of the world is ready to pour if only the conditions in the country can justify the investment.

Yet, at the very moment when these enormous bids are made, war has broken out in Hunan and in Kiangsi, and it would appear as though China is again on the verge of a long drawn out civil war. One can only ask: *How long, oh! Lord, how long!*



# Mr. Henry L. Stimson Knows the East

The New Secretary of State

It is particularly gratifying that at the helm of the American foreign policy during the next four years will be the recent Governor-General of the Philippines, Mr. Henry L. Stimson, who knows the Far East, who has made a first hand study of the situation in Asia, who has visited China, Japan and the Philippines and who has met most of the principal men of these countries. Mr. Stimson's chief, the President of the United States, Mr. Herbert Hoover is also no novice in Far Eastern affairs. He lived and worked in China and has that intimate knowledge of the Chinese people which can only come from close association with them in large numbers, particularly as an employer of labor.

It is to the greatest advantage to the Chinese people and to American interests in China that this should be so, for now when questions involving China, Japan, the Philippines, the Asiatic problems of Great



Governor-General Henry L. Stimson

Britain, France and Holland and the rôle of Soviet Russia in Asia come before the President and the Secretary of State, there will be that quick response, that certainty of decision which can only come from first-hand knowledge.

It is interesting that at this time, another well-informed American official comes to these waters. Admiral Charles B. McVay, Jr. has served with the Asiatic Fleet and was in charge of the American Yangtze patrol during a very trying period. He understands the situation in China; he has a broad sympathy for the Chinese people and a keen appreciation of their individual virtues. There is an advantage in having Admiral McVay in the Far East, in that he will not be carried away by temporary enthusiasms and therefore will not have to repent unsound judgments. His suggestions will be respected by such men as President Hoover and Secretary of State Stimson—men who know.

## Japan, China and Russia

CHINA AND HER POLITICAL ENTITY, BY HSU SHU-HSI, PH.D.; NEW YORK, OXFORD UNIVERSITY PRESS

Dr. Hsu has provided an interesting and important study "of China's Foreign Relations with reference to Korea, Manchuria and Mongolia." This volume is important, if for no other reason, because most of the sources used are Chinese: The documentation is from Chinese state papers and historical monographs. It therefore represents not only a Chinese point of view, but one which is not dependent upon foreign writers for material and guidance. There is so much of Chinese source material that is a closed book to foreigners who are unable to read the characters, that a writer who opens the portals to this mansion is worthy of the gratitude of all who pretend to a scholarly attitude towards this problem.

Although all the Powers are mentioned in some phases of the statement of China's sufferings at the hands of the imperialists, Dr. Hsu naturally devotes himself principally to Russia and Japan in their relationship to China and to each other, as his study is largely of those forces which struggles for control of extra-mural China. It is interesting to compare Mr. Hsu's statement with that of Dr. Paul Hibbert Clyde whose "International Rivalries in Manchuria," is more dispassionate, less tendentious and therefore more likely to be fair. Although Dr. Hsu possesses sources which were undoubtedly closed to Dr. Clyde, he tends to show his bias constantly, which is unfortunate for in the assembling of his material and in his general statement, he is wholly historical and avoids propaganda as scrupulously as one does the plague. Yet, is he to be blamed if bias does occasionally appear? After all, Dr. Hsu is a Chinese and he therefore cannot avoid the shame and

resentment which every Chinese must feel at the weakness of his country and its territorial losses.

A curious note runs through the entire volume. Dr. Hsu seems to feel that no Power should have taken advantage of Manchu incompetence or of China's weakness, that Russia should not have sought to develop vast areas which were serving no useful purpose while wholly under China's jurisdiction, that Japan should have remained a small power, even perhaps a vassal of China, while China bathed in the trough of corruption, inefficiency and at times, political imbecility. Of course, Dr. Hsu nowhere says that, but as I closed his book, that was a dominant impression with me. One of the post-war tendencies was to criticize and abhor imperialism, but a historian must know that a vacuum is as impossible politically as physically. When a rich area is unexploited, undeveloped and anarchic, some Power will step in and assist nature to bring forth fruit. All of human history is an account of such actions. The various expeditions to the North and South Poles is the last chapter, perhaps, in man's search for virgin areas, but even at this moment, territories are being developed by capitalistic imperialism which would otherwise have been barren in their contributions to the requirements of the human race. Why not in Korea, Manchuria and Mongolia? Why should the continent that is China be treated differently from other areas?

In the presentation of his material, the statement with regard to Russia's participation is as correct as the references to Japan. But in his suggestions and conclusions, Dr. Hsu tends to condemn Japan more than Russia. One reading this book must reach the conclusion that if imperialism in China is a political wrong, the real



culprit was Czarist Russia (little appears about Soviet Russia because the study ends before Borodin's era begins) but in his comments Dr. Hsu tends to place Japan rather than Russia in an odious light. Perhaps this is due to the fact that when he prepared his work, he assumed that Russian imperialism in China had ceased and that Japan's was still continuing. In fact in his preface he says:

Russia's hold upon Chinese territory has since been much weakened by the revolution at home; but Japan, free from domestic troubles, has shown no sign of retreating from her entrenched position.

Were Dr. Hsu to continue his chapter to include the years 1924 to 1927, would he not view this picture differently?

Certain references, which do not appear elsewhere are particularly fascinating. The following is an example of a despatch from Viceroy Li Hung-chang to the Tsungli Yamen in 1885 (?) with regard to Prince Ito:—

This envoy (Ito) has travelled extensively in Europe and America and has done his utmost to learn from them. He is in possession of statesmanlike qualities; applying himself diligently to commerce, to neighborliness, to the welfare of the people, and to the training of the army and navy; not prone to bellicose talk, nor to aggression against small nations. There is no doubt that within a decade Japan's prosperity and power will be considerable. This is a distant and not an immediate danger to China. I earnestly hope that those who are at the helm of state will occupy their attention with the problem while there is still time.

One almost need not comment on the Viceroy's perspicacity. He saw what a power Japan would develop into and Dr. Hsu is unsparing with his own country which saw Japan developing into one of the World's principal powers, while China did nothing at all to meet her in the race. When Li Hung-chang wrote this of Ito, Japan had not yet defeated China or Russia, but that was perhaps inevitable, for China, the apex of the triangle was constantly growing weaker and more decadent, while Japan was more surely turning a petty island kingdom into a great modern state. Even to-day, four decades later, China cannot defend herself against either Japan or Russia and is still dependent upon British and American good-will to save her political entity, should either Japan or Russia choose to unsettle the existent equilibrium.

Dr. Hsu deals fully with the Li-Lobanoff secret alliance. He provides details where are missing from other volumes. He has the memoirs of Li Hung-chang (which incidentally omit this period) and the records of the Chinese Government. Somehow, he reaches the conclusion that Lobanoff was a particularly "good" man who was moved by political righteousness to assist China. This interpretation is not borne out either by the facts presented in his own book or by data provided by recent writers on the subject. He completely omits the Franco-Belgian implications in this phase of Russian imperialism.

Of psychological as well as political interest is a tendency of the writer to blame the United States for not "saving" China. It is rather difficult to understand. Wherein lies American responsibility. This attitude toward the United States seems to be

usual among Chinese and has recently been particularly fostered by a school of American journalists and missionaries, who assume that the United States should support China, even to the extent of using armed force against Japan, Great Britain, or any other Powers with whom China, for the moment, may be at issue.

In his preface, Dr. Hsu says:—

By the correspondence relating to the formation of the four-power financial consortium, as well as by the result of the Washington Conference, the United States has shown herself disposed to acquiesce in "accomplished facts." This attitude, let us hope, is merely one of those aberrations of American foreign policy initiated by the Wilson administration. The United States has not ceased to have important economic and cultural interests in China, and hence cannot remain long indifferent to the fate of that country. Already she has reaffirmed the principle of the territorial and administrative integrity of China and canceled the Lansing-Ishii agreement. It is possible that a frank return to the active policy of restoring the complete control of Manchuria to China as pursued consistently by the McKinley, Roosevelt and Taft administrations, is thereby presaged?

Again on page 365, he says:—

The United States was the only power that yet could do something. It was the opinion of the Chinese government that if the United States could only say, to use Minister Reinsch's expression, "Such matters concerning foreign rights in China, in which we have an interest by treaties, policy, and tradition, cannot be discussed without our participation," the danger would largely dissolve. It never occurred to President Wilson, however, that the United States could be of such service. As early as February 8, he wrote the following characteristic letter to Minister Reinsch:

I have had the feeling that any direct advice to China, or direct intervention on her behalf in the present negotiations, would really do her more harm than good, inasmuch as it would very likely provoke the jealousy and excite the hostility of Japan, which would first be manifested against China herself. . . . For the present I am watching the situation very carefully indeed, ready to step in at any point where it is wise to do so.

Such an opportune point never presented itself to President Wilson.

Again on page 392, he continues:—

Throughout the greater part of the Wilson administration the attitude toward the developments in the Far East was one of waiting. The policy of the Taft administration, although it had been shattered, formed nevertheless a line of defence for the political entity of China. For a long time after its termination, none seemed to have been evolved to take its place.

Now, one wonders why the United States should provide this line of defence, while China seems to do nothing. At this moment of writing, the United States has again assumed a positive policy of assisting China. The Soong-MacMurray Treaty broke the ice which made the revision of the tariff possible and which prepared the way to an alteration of existing treaties. The attitude of all Powers, including Japan, towards China changed for one of helpfulness; yet to-day, we are on the verge of another civil war; generals are squabbling over territory; national taxes are withheld by neo-tuchuns; the railways are seized by militarists. China's first line of defence cannot be the United States; it must be reorganization and reconstruction in China.

G.E.S.

## American Trade with China and Japan

IN his analysis of the American foreign trade for 1928, Mr. O. K. Davis, Secretary of the National Foreign Trade Council, gave the following summary regarding the trade with China and Japan:

"The past year has seen the recovery of China as a market for American goods to a degree that is now becoming consistent with that country's reputed promise. With the cessation of revolutionary hostilities during 1928 China's imports from the United States increased by fifty per cent. over the preceding year. They are now estimated to reach \$130,000,000 for the entire year 1928, which is also a substantial advance over our average exports to China for the past three years of about \$115,000,000.

"Our exports to Japan also increased in 1928 by about eight per cent. and are estimated for the full year at about \$250,000,000, or five per cent. of our entire export trade. Altogether our exports to Asia improved by 12 per cent and gained about \$60,000,000 over 1927."

The fact must always be apparent that the essential concern of the United States in Asiatic countries is a trade and not a political interest. Japan's trade with the United States is approximately twice as large as China's trade. Japan's trade is growing and it is to be hoped that the trade of China will increase with peace and stability. An excellent indication of possibilities is the purchase by the Ministry of Railways of 10 Mikado type locomotives for the use of the Tientsin-Pukow Railway and the proposed air-mail contract with Curtis.

Japan's trade with the United States is likely to develop into an export trade. Japan manufacturing such articles which it is unprofitable to produce in the United States. On the other hand, the United States will, for many years, be an exporter to China, particularly of heavy machinery, railway equipment and electrical goods. A decade of peace in China, a decade of friendship between China, Japan and the United States and the trans-Pacific business of the three countries will enter the billion dollar class.



# The New Chinese Navy River Gunboat "Hsein Ning"

By Lieut-Commander Chi F. Yeh, S. B. Naval Architect, Kiangnan Dock & Engineering Works, Shanghai.

IN July 1909 Prince C'hun, the regent of the now defunct Manchu dynasty, by imperial decree, appointed his brother Prince Tsai Hsun, head of the Imperial Chinese Navy and ordered that a modern navy be constructed at once, at a cost not to exceed the equivalent of U.S. Gold \$240,000,000 and it was assumed that money for this new navy would be furnished by the imperial household, who were fabulously wealthy. Following this imperial decree a great deal of work was done on paper, trips were taken abroad to secure latest foreign ideas and other preliminary arrangements entered into. However, after almost twenty years we find the Chinese Navy of to-day to consist of the same vessels, with a few minor exceptions, as it did when this imperial decree was issued. Money has been appropriated during this period of twenty years for naval purposes but it was either diverted for other uses or wasted. None has been used in constructive work for the navy.

The Nationalist Government which absorbed the Chinese Navy in 1927, while not having as pretentious program as that of the prince regent in 1909, has nevertheless adopted a naval program which is being carried out in a constructive way. The present navy has no appropriation of G.\$240,000,000. but with the money they have, vessels, and modern vessels too, are actually being constructed. At the present time several modern war vessels are being constructed at the Kiangnan Dock & Engineering Works, which is the Chinese Navy Yard.

In this article I will give a description of the first of these vessels as per the above title, the River Gunboat "Hsein Ning."



Lieut-Commander Chi F. Yeh, S.B.

Principal Dimensions:		
Length over all	.. ..	180'0"
Length between perpendiculars	.. ..	170'0"
Breadth moulded	.. ..	24'0"
Depth moulded	.. ..	11'0"
Draft with normal equipment	.. ..	6'0"

The entire vessel is constructed of steel with a long forecastle deck, the general arrangement is as shown in Fig. 1. The pilot house and other vital parts of the vessel are protected by bullet proof steel. There are three rudders operated by either power or hand steering gear. The power steering gear being capable of putting the rudders hard over in fifteen seconds when the vessel is going full speed ahead. Anchor handling arrangements consist of steam windlass and steam capstans and may be operated by hand in event of failure of steam power and are of sufficient capacity to handle the anchors which are 2,000 pound stockless bower anchors. The vessel is equipped with two 26'6" motor sampans and two 22'0" sampans with proper modern boat handling and stowage arrangements. There is a flooding system for flooding magazines, etc., fresh and salt water system, drainage system, fire system, flushing system, modern plumbing, voice tubes and modern radio equipment.

In the deck house, quarters are provided for one admiral, nine staff and other officers and under the forecastle deck, quarters are provided for seventy chief petty officers and enlisted men.

The propelling machinery consists of two sets high speed inverted direct-acting surface condensing triple expansion engines constructed to withstand a working pressure of 250 pounds per sq. in. driving two solid brass propellers. The

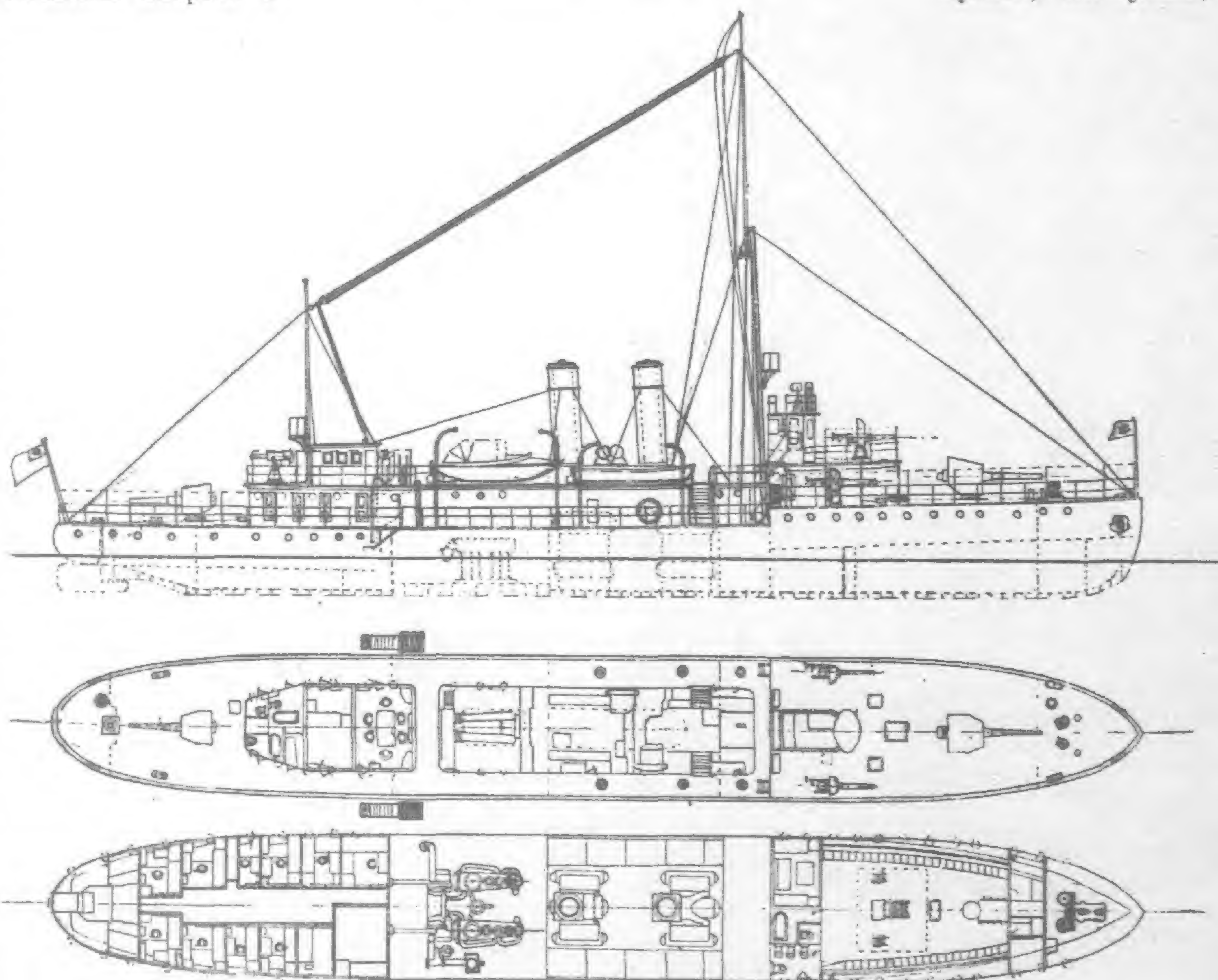
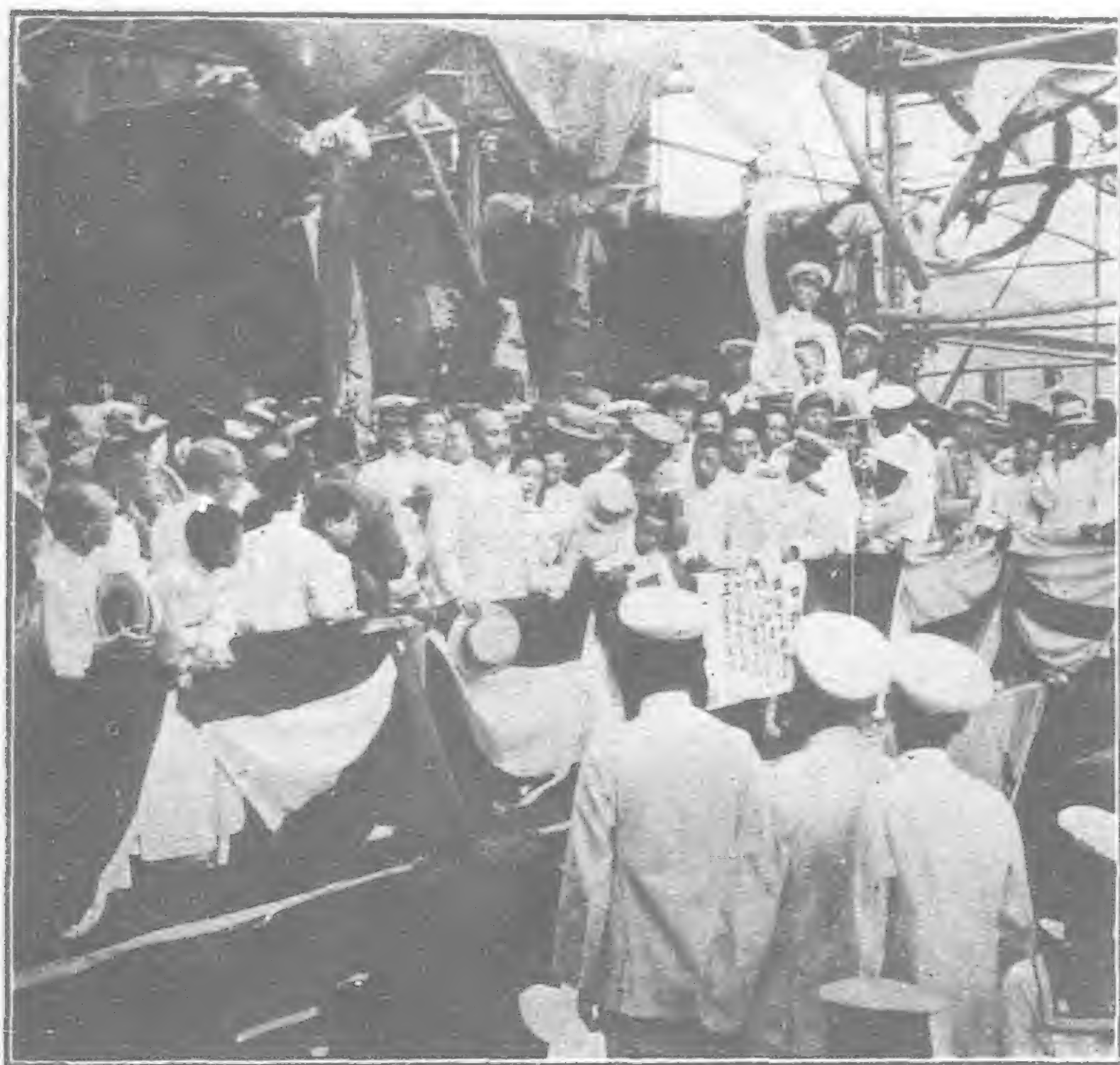


Fig. 1.—General Arrangement of River Gun Boat "Hsein-Ning"





General Chiang Kai-shek Launches the New Gunboat

engine room contains all the necessary auxilliary machinery such as condenser, circulating pump, feed water heater, air pump, feed pumps, donkey pumps, sanitary pump, etc. all of the latest design.

Two water tube boilers built by Thornycroft & Co. designed for 250 lbs. working pressure and burning coal furnish steam for the vessel. Figs. No. II and III show arrangement of machinery, and boilers.

Electrical equipment consists of two 25 kw., 120 volts compound wound, reduction-gearred turbo generators and one 10 kw., 120 volt D. C. Compound oil-engine-driven generator. There are two lighting circuits, one battle circuit and one standard circuit. There is a an electric general alarm gong system provided as well as officers call bell system also two 24" search lights and one 8" search light.

Ordnance consists of the following:—

- One—4.7 Quick firing gun on bow
- One—4" Quick firing gun on stern
- Three—6 Pounders on forecastle and bridge
- One—3" Anti-aircraft gun on bridge
- Four—Machine guns with bullet proof shields

#### Progressive trials

Speed	I.H.P.	Boiler Pressure	Vacuum	Slip %	R.P.M.
8	137.89	250 lbs.	26"	20.1	150
10	303.8	"	27"	22.47	190
12	656.2	"	27½"	28.01	250
14	1073.0	"	27½"	29.3	290
17	2255.0	"	26"	31.92	390



The Trial Trip on December 15, 1928

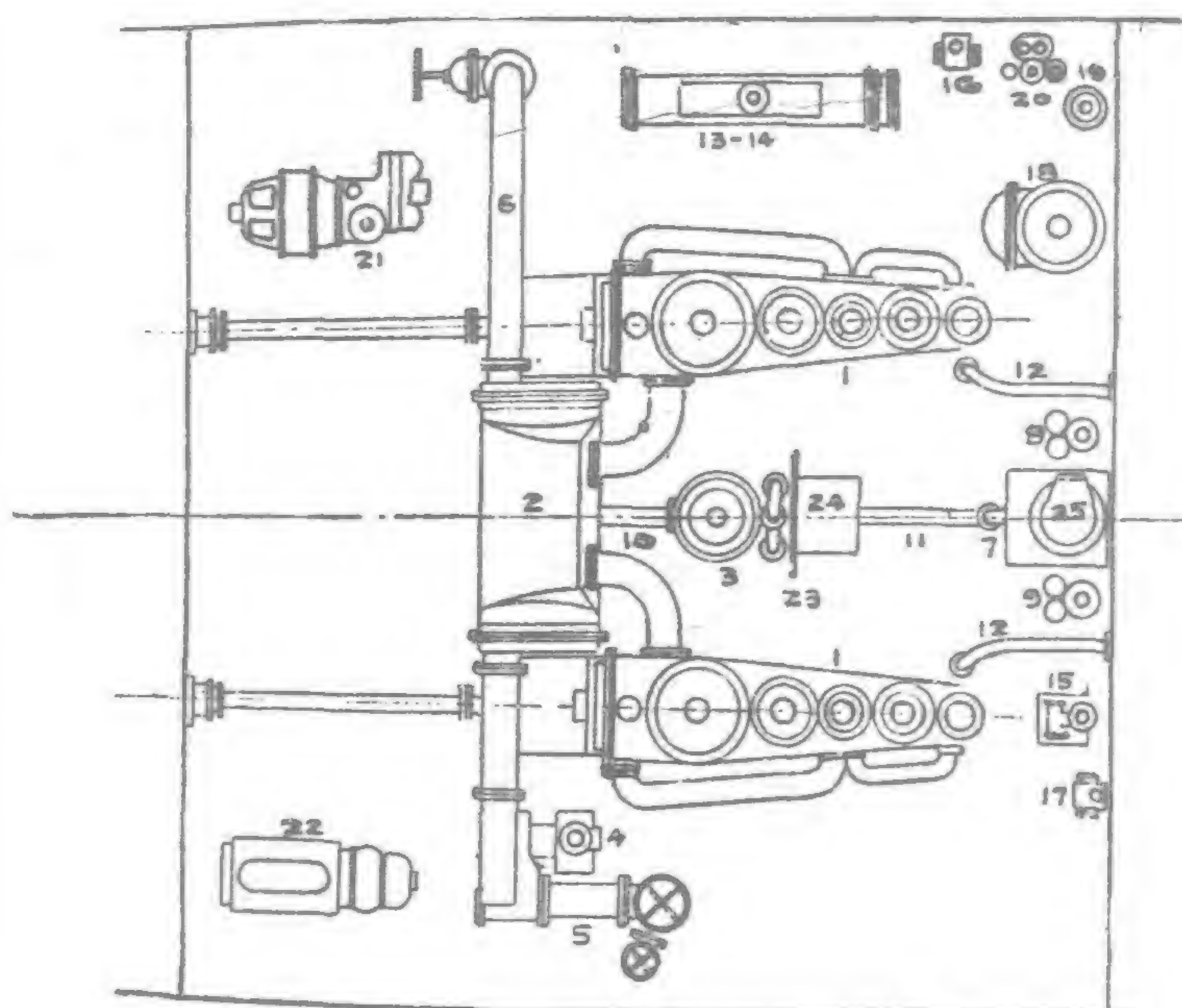


Fig. 2.—Arrangement Of Main and Auxiliary Machinery

- |                             |                                     |
|-----------------------------|-------------------------------------|
| 1.—Main Engine              | 14.—Aux. Air and Circ. Pump         |
| 2.—Main Condenser           | 15.—Gen. Service Pump               |
| 3.—Main Air Pump            | 16.—Fresh Water Pump                |
| 4.—Main Circ. Pump          | 17.—Sanitary Pump                   |
| 5.—Main Injection           | 18.—Evaporator                      |
| 6.—Out Board Delivery       | 19.—Distiller                       |
| 7.—Hot Well                 | 20.—Evap. Feed and Dist. Circ. Pump |
| 8.—Main Feed Pump           | 21.—25 k.w. Turbo-Generator         |
| 9.—Aux. Feed Pump           | 22.—10 k.w. Oil Eng. Generator      |
| 10.—Main Air Pump Suction   | 23.—Gauge Board                     |
| 11.—Main Air Pump Discharge | 24.—Log Desk                        |
| 12.—Main Steam              | 25.—Feed Heater                     |
| 13.—Aux. Condenser          |                                     |

#### Consumption trials

Draft forward	..	..	5'4"		
Draft aft	..	..	6'7"		
Draft mean	..	..	5'11½"		
With 2 Boilers	Mean speed	R.P.M.	Mean Boiler Pressure	Aver. coal lbs per hr	per sq ft. H.S.
	12	250	250	3275	.65
	17	370	250	8200	1.64
With 1 Boiler	12	249	250	3011	1.204

This vessel is of special light construction so as to insure light draft with special arranged longitudinal system in order to sustain the enormous stress developed by this type of vessel when going through the Upper Yangtze Gorges and special supports had to be arranged to carry the heavy batteries on deck. From the above trials it will be seen that this is a high speed for this type vessel. and considering the speed, economical as far as fuel consumption is concerned.

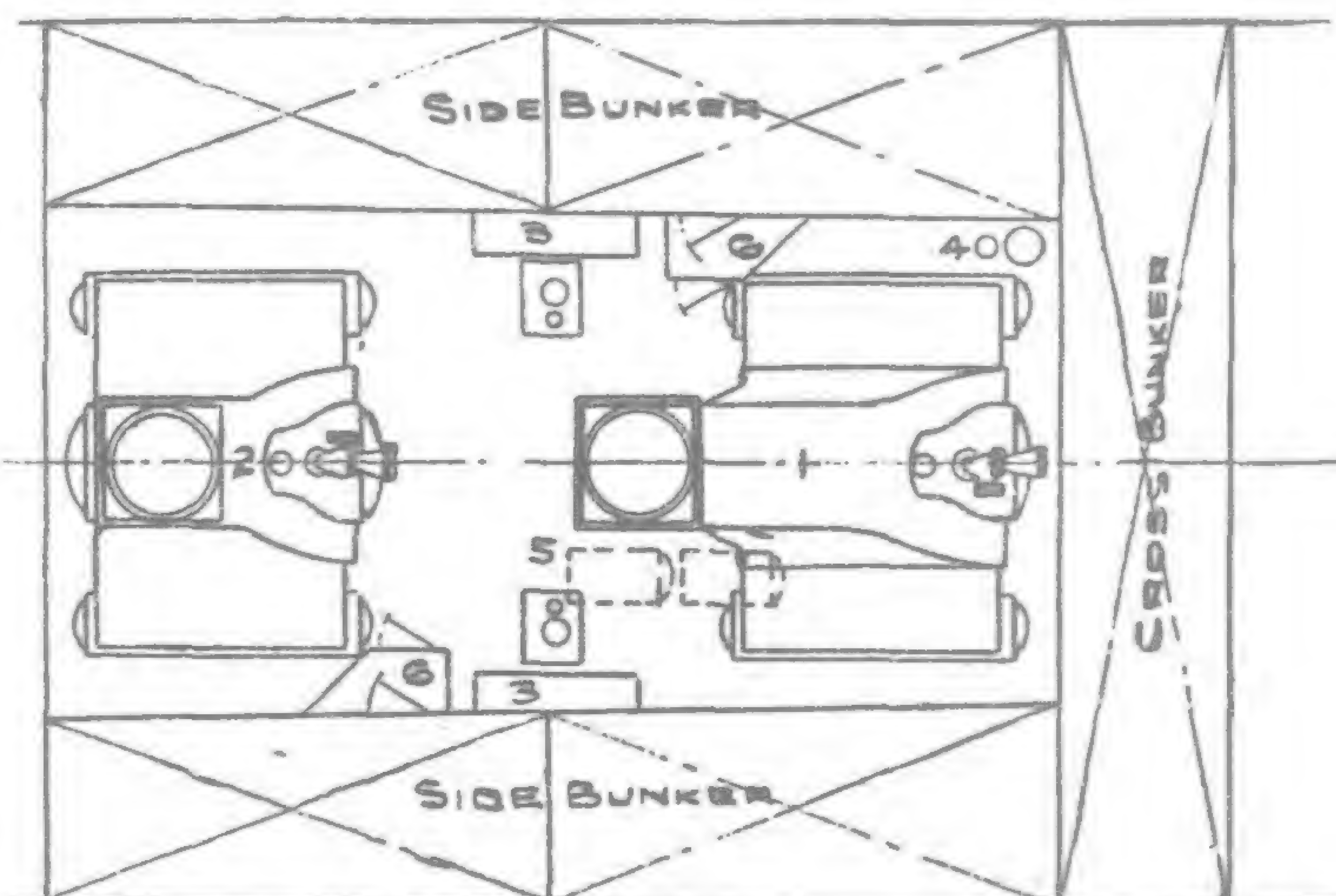


Fig. 3.—Arrangement of Boilers

- |                 |                     |                    |
|-----------------|---------------------|--------------------|
| 1.—Ford Boiler  | 3.—Blower           | 5.—Galley Air Tank |
| 2.—After Boiler | 4.—Hot Water Heater | 6.—Air Lock        |



# Motorizing the Modern Sugar Mill

Philippine Island Corporation Installs New U.S. Equipment for Power in Latest Central Construction

By H. F. Wilkins

ONE of the most thoroughly modern plants of any kind yet built in the Philippine Islands is the new sugar central at Tarlac, 75 miles north of Manila, constructed for a big Spanish corporation at a cost of \$3,000,000.

New and up-to-date equipment installed in the central represents two-thirds of the total cost of the mill and includes electrification throughout. Since sugar is the principal export of the Philippines and since this is the largest and most modern sugar mill in the Islands, its importance to engineers, builders and exporters is attracting attention beyond local interest.

And with recent agitation both in the United States and elsewhere over the proposed Timberlake exclusion bill, which would limit importation of duty-free Philippine sugar in the United States to 500,000 tons annually, there is intense interest in every aspect of the sugar situation in the Philippines.

The Compañia General de Tabacos de Filipinas is the name of the corporation owning the hacienda of 25,000 acres on which the new development is placed. The name of the company is generally shortened to Tabacalera. Their interests are largely concerned with tobacco production, but this is the second large sugar central they have built in the Islands. A separate company called the Central Tarlac has been organized for the purpose of handling this particular project, but 60 per cent. of the stock is Tabacalera's. Much of the outstanding stock is marketed locally. Rice has been grown on this hacienda for 35 years, but recently they have been increasing the sugar yield to such an extent that within a few years the quantity of cane harvested will be large enough to keep the mill grinding at capacity.

## Irrigation

This sugar central project was held up for some years, pending a definite agreement between the government and the company in respect to certain claims on the use of water from the irrigation system constructed by the government in 1907. In June, 1926, the P.I. Legislature definitely outlined the status of this irrigation system so that the company was assured of a flow of approximately 18,000,000 gallons a day in the canal that runs near the site of the

central. This water will be for mill uses. An auxiliary spray pond will be installed as an emergency unit in case of failure of the canal supply. Loss by evaporation when the spray system is in service will be made up from local water supply.

With the equipment installed at present, the capacity of the mill is 3,000 metric tons of cane per day. Eventually, with added equipment, it is planned to raise this capacity to 10,000 metric tons per day. This would make its capacity about equal to that of the big Jaronu mill in Cuba.

The seasonal output of finished sugar with equipment now being installed, if the cane supply is up to calculations, will be between 60,000 and 70,000 tons. The milling season in the Philippines is from November to April. With later additions, the seasonal output is estimated at 100,000 tons of sugar or more.

## Buildings

All structures on the new Tarlac Central are of structural steel and galvanized iron, using No. 22 copper-bearing sheets. There are 14 buildings altogether, though some of them are virtually under the same roof. All buildings have concrete floors averaging four inches in thickness. Lighting facilities are provided by steel sash furnished by David Lupton Sons Company. Rolling shutter doors from the J. G. Wilson Corporation are installed.

The cane shed, where cars are unloaded, is 45 feet wide, 90 feet long, and 18 feet high.

The car-tip is a Fulton Iron Works standard mechanism with full motor control. In this cane unloading shed the raw material falls on an auxiliary cane carrier of steel slat construction running in a pit at right angles to the main cane elevator. This latter is of similar steel construction, using wooden slats. It is 84 inches wide and delivers the cane to the pre-crusher mill. The main cane elevator is 126 feet long.

The main mill room is 180 feet long, 68 feet wide, and 38 feet high to the bottom chord of the roof truss. The boiler room, which is of the same width and height but 200 feet long, is a continuation of the mill room. The clarification building, boiling and curing building, run parallel with the mill room and are uniform in construction.

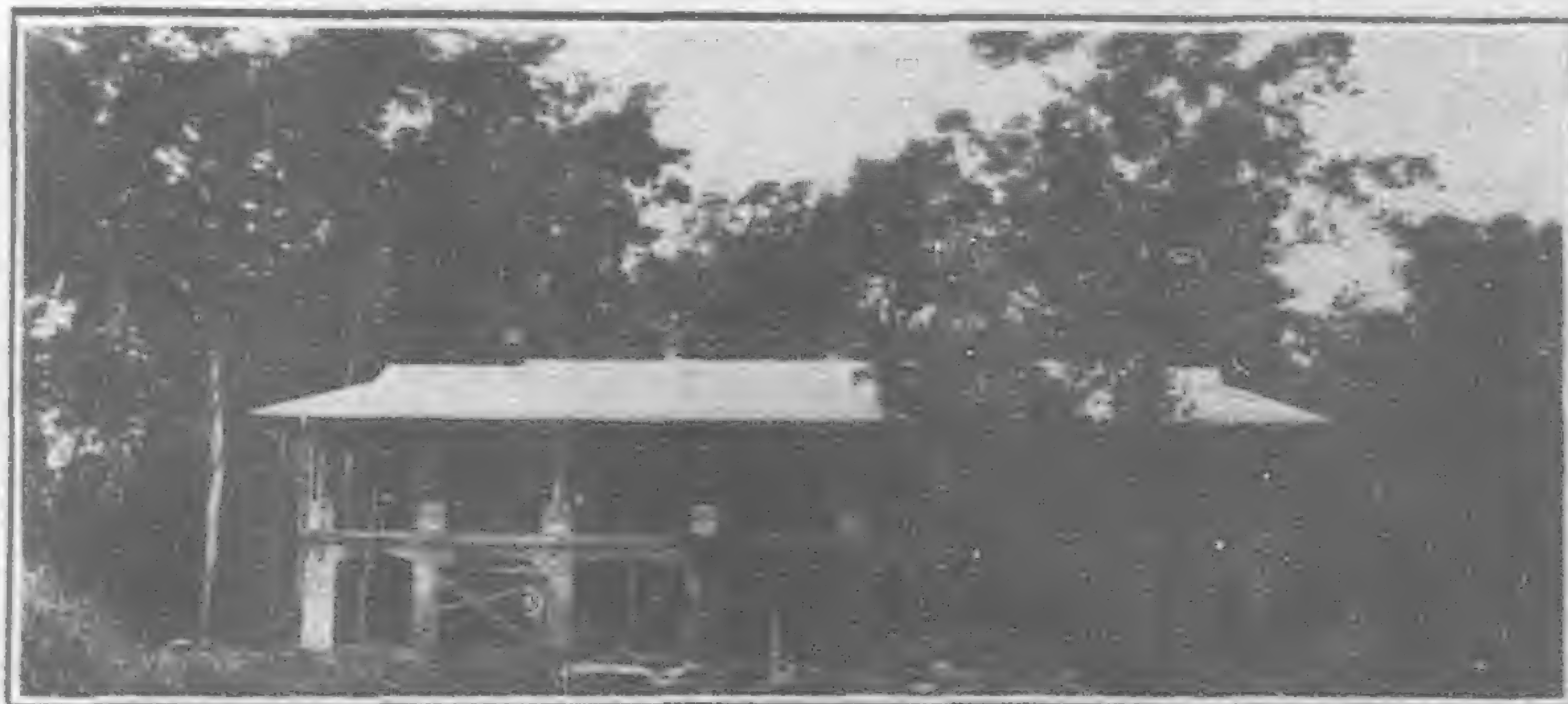
The sugar room, where the finished product is made and stored, is laid with a concrete roof, the first of its kind ever built in the



Tarlac Sugar Central, Showing Front Elevation from Boiling House Side



Laborers' Houses, Tarlac Central



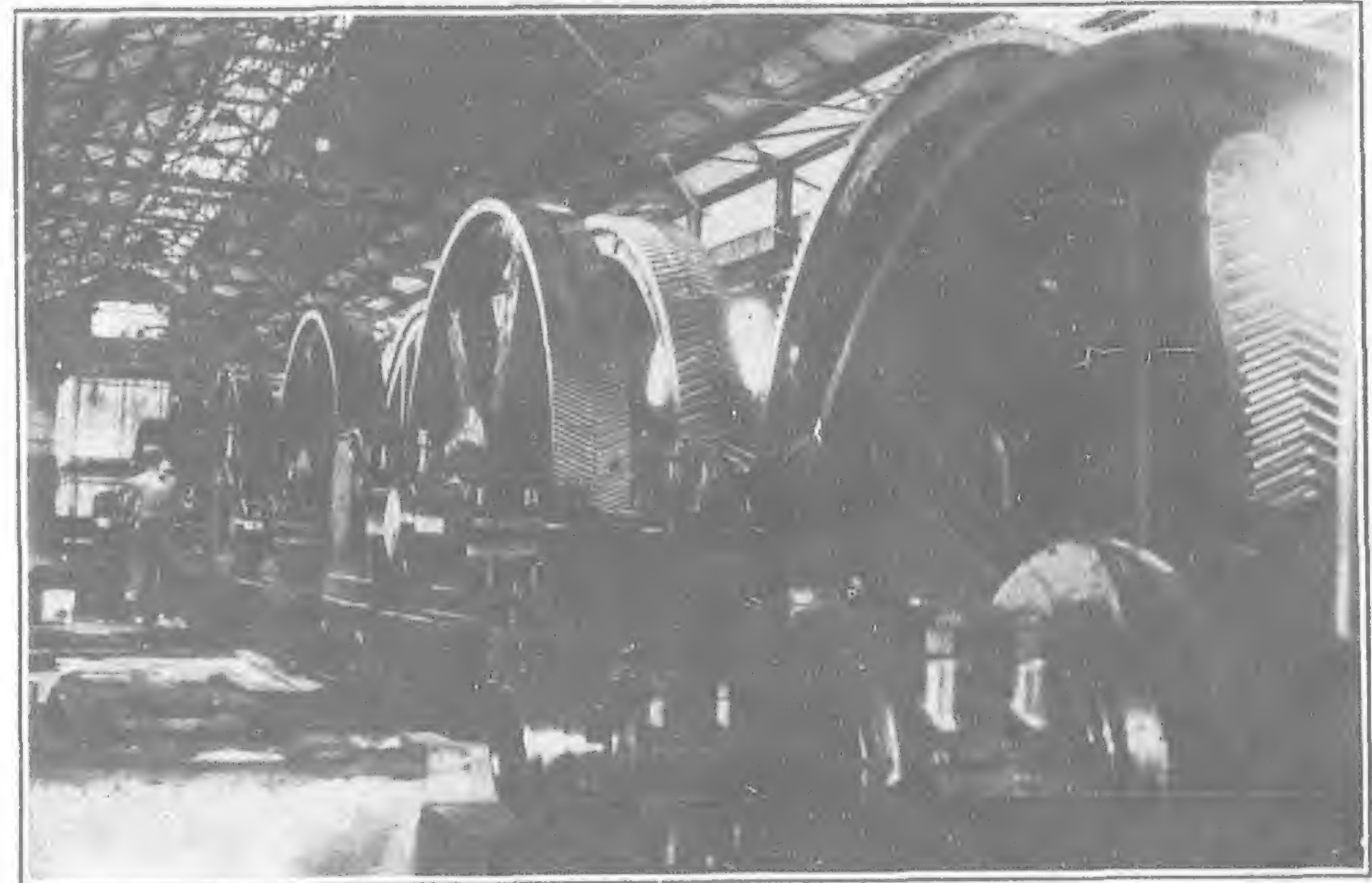
Employee's Club House, Tarlac Central



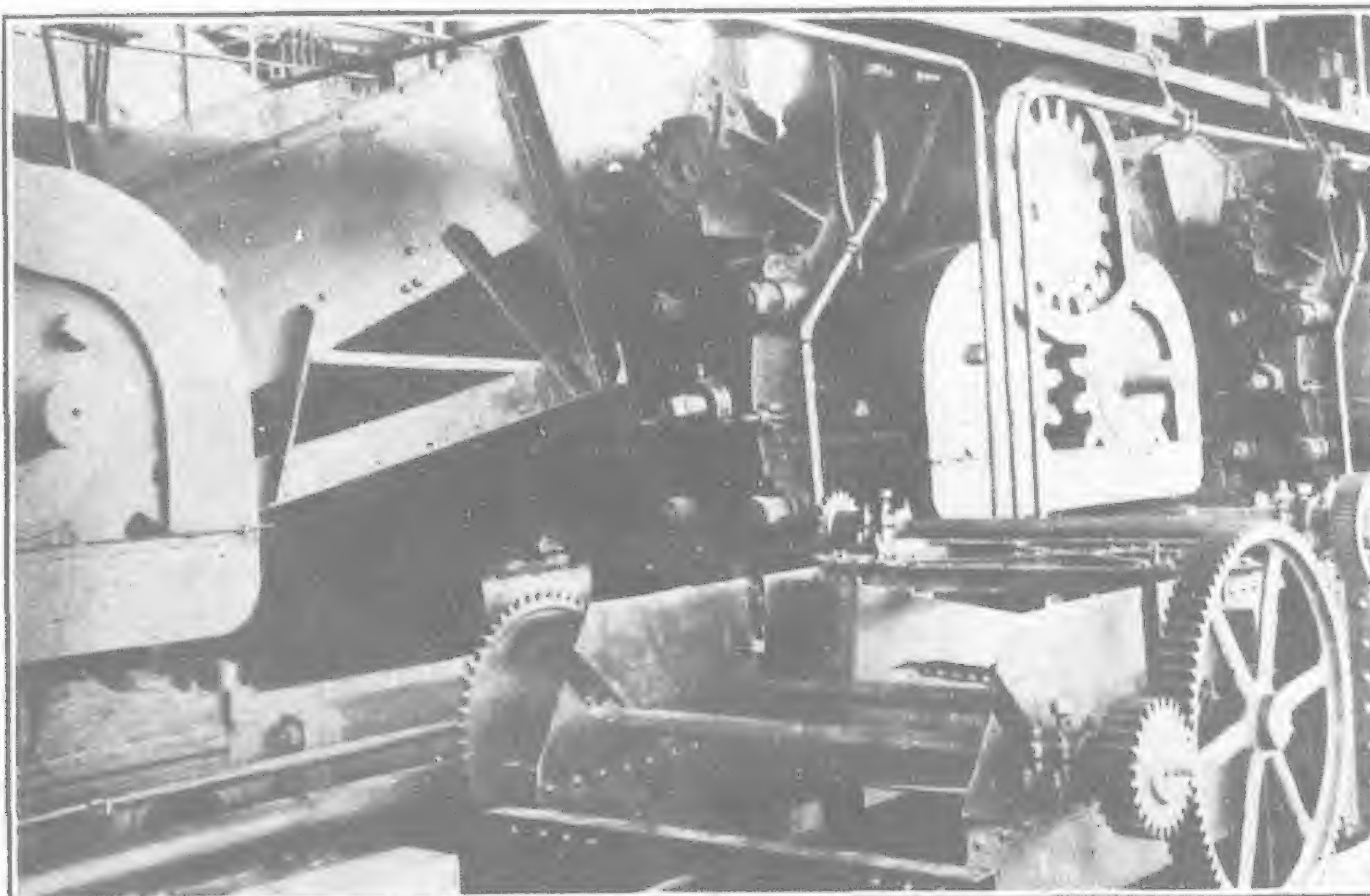
# THE NEW TARLAC SUGAR CENTRAL, PHILIPPINES



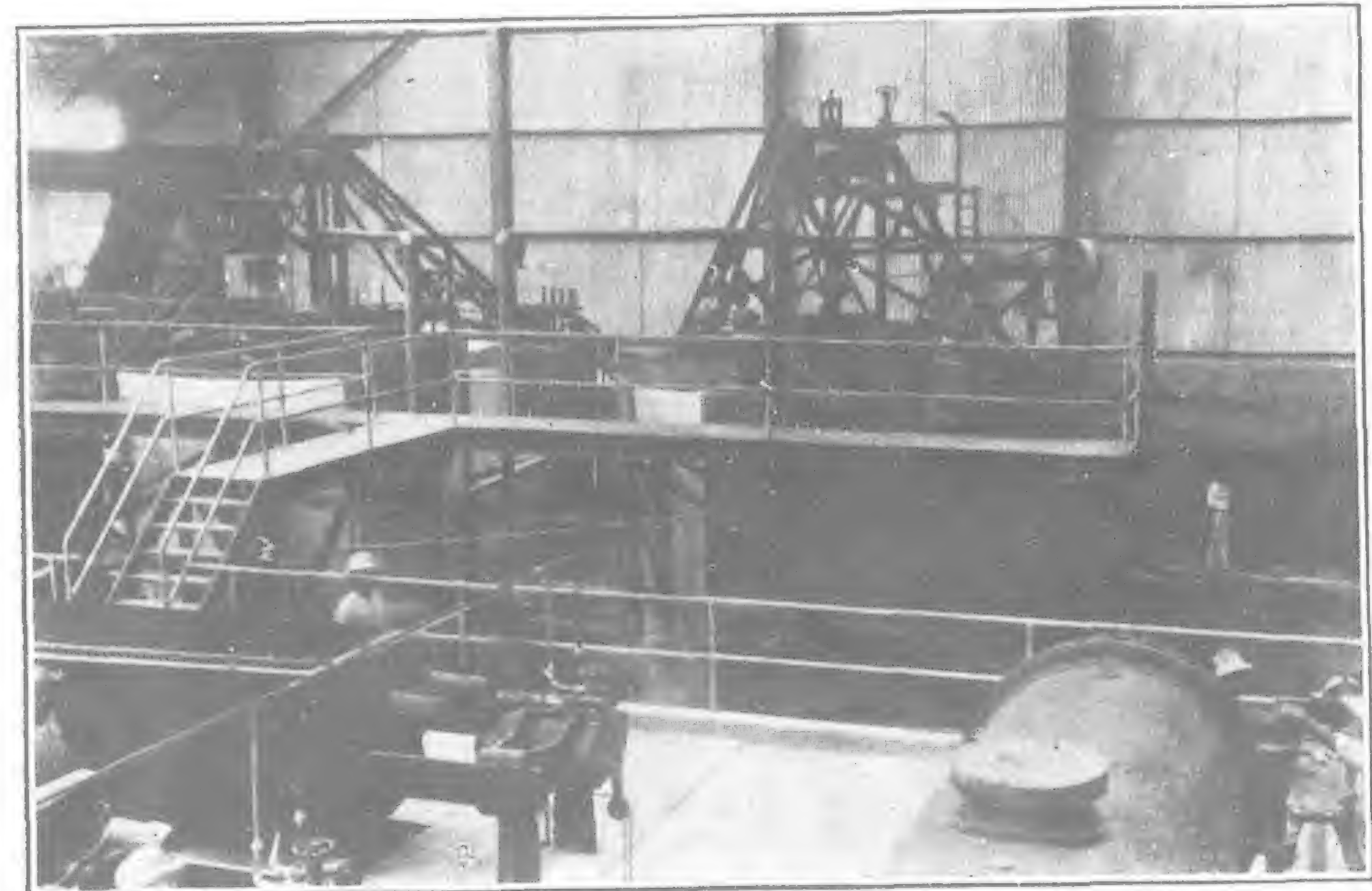
Excavating Cane Carrier Pit, Showing a Pawling and Harnischfeger Gasolene Drag Line Excavator at Work



Showing Erection of Gear Drive for 36-in. by 84-in. Type B. Fulton Iron Works 15 Roll Mill Driven by 300 H.P. Induction Motors

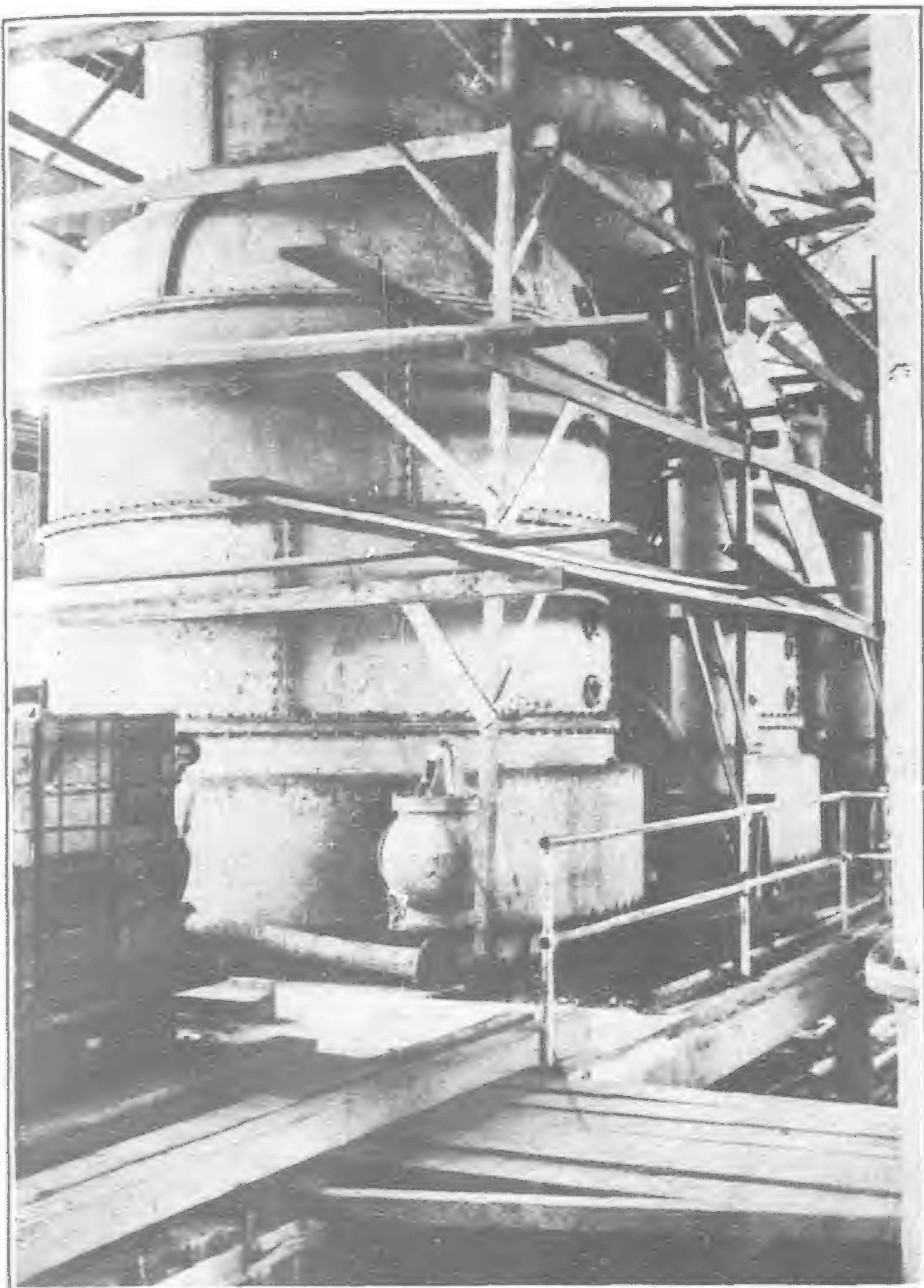


Detail of Juice Strainer, Showing Mill Crown Wheels and Intermediate Carrier



At the Top of the Mill Room. In the Background are the Tops of Two Dorr Clarifiers. In the Foreground, Filter Press (Left) and Juice Heater





First and Second Cells of 44,000 sq. ft. Quadruple Effect Built by Joubert and Goslin. This is said to be the Largest Unit of its Kind Ever Built

Philippines. The idea is to keep out tropical moisture. A 2½ inch layer of concrete is laid on reinforcing mesh, covered with tar paper and topped with another 2½ inch layer of concrete. This makes a substantial and absolutely damp-proof room. The Fulton Iron Works has the contract for furnishing the complete factory, including the mill buildings, sugar loading shed and machine shop. Negotiations between the Fulton Iron Works and the purchaser were conducted in Manila by the Pacific Commercial Company, the Philippine agents of the Fulton Iron Works Company.

### Plant Innovations

Other buildings under separate contract include a chemical laboratory, a locomotive roundhouse and a rodegá (warehouse), uniform in construction with the mill building. Several features have been included which are distinct innovations in sugar mill construction in the Philippines. One of these is the arrangement for locking the plant in case of strike. Heavy wire netting is used on the open front of the mill and boiler room, along the whole length. Gates are installed at convenient intervals.

All floors are of reinforced concrete construction, supported on steel beams with angle-iron curbs. All stairways are of steel, with concrete treads. Hand rails are made of 2½ inch galvanized pipe. Five-foot ventilators are used in roof construction.

All columns supporting loads are designed with a safety factor of four, excepting the steel work for the vacuum pans and the evaporators, which have a factor of safety of six.

### Equipment

The cane handling machinery and milling machinery includes two 50-ton Fairbanks track scales, 40 feet long, for 42-inch gauge track. One is for loaded and one for empty cars. An electric-driven car puller made by Caldwell & Co. is equipped with an 11-horse power motor and is operated by foot controls. It is rated

at 6,000 pounds at 50 feet a minute. The car tip is the standard double sector type made by the Fulton Iron Works and has full motor control. It is long enough to handle three five-ton cane cars at once, or a single 30-ton cane car of the Manila Railroad type.

The auxiliary cane carrier has a capacity of 40 tons of cane. It is located in a concrete-lined pit, 34 feet deep, at right angles to the main cane carrier, which is driven by a 60-horse power motor. These conveyors were designed by the Fulton Iron Works Company.

The cane knives are of the Ramsay swinging type, made in England. They are driven by a direct-connected 200 horse power motor.

The milling plant consists of a Fulton Iron Works heavy-duty Type B mill, with a double crusher and five mills. The pre-crusher rolls are 42 inches by 87 inches, and the crusher rolls 38-inches by 87 inches. They are built of special roll metal with heavy steel shafts.

The mill rolls are 36½ inches by 84, and each mill and crusher is driven by an independent electric motor, rated at 300 horse power at 44 r.p.m. The drive is through double-reduction herringbone gears running in oil. Between the gear and the motor is a flexible coupling and the first and second motion pinions are integral with the pinion shafts. The motors all operate from one master control board.

The milling plant is complete with seven hydraulic pressure regulators, motor-driven trash elevators and motor-driven maceration pumps. The bagasse carrier, also motor-driven, running from the last mill to the boiler room, discharges into a cross-boiler feeder.

Provision is made in construction for eventually adding two more mills, making 21 rolls and a double crusher. The foundations are laid for these.

### Boiler Room Equipment

The boiler room is as complete and up-to-date as any in the Orient, and much time was spent planning it and selecting its fittings. Eight Edgemoor water-tube boilers are set in batteries of two each. Each boiler is normally rated at 857 horse power and is the last word in boilers for the sugar mill. Working pressure is 165 pounds.

The boiler settings were designed with particular reference to Philippine conditions in order to avoid later changes, which some engineers have found necessary to make in Philippine mills to suit local conditions. The length and height of the combustion chambers were closely calculated with reference to the size of the boiler.

When grinding, the bagasse produced is the only fuel used, and in order to take full advantage of the heat units therein, National Arches made by the M. A. Croft Company are used. These are constructed of special tiles, 16 by 18 inches, which are installed by hooking them to I-beams. National stokers are also used. To overcome the tendency of the bagasse to form clinkers, tipping grates are installed, all removable. Other boiler equipment includes Vulcan soot blowers and Elasco superheaters. Pressure blowers made by the Sturtevant Company of Boston are included as auxiliary equipment to improve the draft. They are motor-driven and are designed to increase boiler ratings up to 175 per cent. For these Edgemoors, that makes the rating 1,485 horse power at capacity.

The boiler feed pumps include a motor-driven centrifugal and a steam turbine-driven centrifugal, each unit rated at 1,000 gallons a minute against a 400-foot head.

The stack is made of steel and is self-supporting, resting on a big concrete base. It is 175 feet high and 16 feet in diameter.

### Power Plant Equipment

Three 2,000-kilowatt General Electric turbines, running at 3,600 r.p.m. normal speed, furnish three-phase, 60-cycle, 480-volt current for the entire factory motors, all of which are supplied by the same firm. In order to provide the greatest flexibility in the speed of the mill motors in accordance with the very latest practices, the turbines are designed for operating on a variable frequency system which gives a speed range from 39 to 65 cycles, which is immediately reflected in the motor speeds. Variation in generator frequency is accomplished by two special governors on the steam end. The mill motors give full power at low speeds, an advantage in sugar mill operation. This variation in the generator speed constitutes "primary control" of mill motors. "Secondary



control" is obtained by means of individual resistances in rotor windings. This combination of primary speed control affecting the entire group of mill motors and secondary or individual control under normal operation provides the mill operator with a flexibility of operation that is entirely out of the question with steam-driven mills. One generator will be used for the mill motors, one for the house motors, and one for reserve; but the switchboard control is so arranged that if desired any one of the three generators can be thrown on the mill motors and all other practical combinations of synchronous operation employed.

Two off-season power units are provided, each consisting of a 180-horse power, Fairbanks-Morse two-cycle, three-cylinder full Diesel engine, directly connected with a 125-kw. generator. All wiring throughout is in conduits.

### Clarification Machinery

The juice scale is a Richardson Revolving Automatic. Liming machinery includes Richardson tanks and motors to agitate and mix and a Cameron pump for the milk of lime. The three juice heaters are of the horizontal type, each with 1,500 square feet of heating surface measured on the inside of the tubes. The juice heater pumps are motor-driven centrifugals with a capacity of 500 gallons a minute against a 200-foot head.

Dorr clarifiers, made by the Petrie-Dorr Company, are used. These are 20 feet in diameter, with four compartments, and will handle the juice from 2,000 tons of cane in 24 hours.

The 14 filter presses were made by the Shriver Filter Press Company. Each press (42-inch size) has 1,067 square feet of filtering area, and the plates are closed by hydraulic pressure. Mud is carried off by scroll conveyors discharging into mud cars, and is used for fertilizer on the hacienda. A motor-driven press cloth washing machine and extractor are provided, made by the American Laundry Machine Company.

### Boiling House Equipment

Joubert and Goslin, manufacturers of the big quadruple effect used for boiling the clear juice, claim that it is the largest one ever built. It stands 39 feet high and has 44,000 square feet of heating surface measured on the inside of the tubes. The pans furnished by the same company are approximately 14 feet in diameter. They are all of the calendria type. Each of the five vacuum pans is rated at 1,600 cubic feet capacity with a heating surface of 2,500 square feet. Vacuum in each pan is obtained by a Chicago pneumatic condenser, 96 inches in diameter.

The vacuum pumps are made by the Chicago Pneumatic Tool Company and are driven by direct-connected synchronous electric motors of 150 horse power each. Each of the two centrifugal injection water pumps serving the battery of seven condensers has a capacity of 7,000 gallons a minute against a 90-foot head, and is operated by a 250 horse power motor.

Curing equipment includes 28 crystallizers of the U type with open top, each with a capacity of 1,600 cubic feet. They were made by the Walsh and Weidener Company.

The centrifugal machines consist of two batteries, one of 14 and the other of 28 units, for the A and B sugars. They were furnished by the S. S. Hepworth Company, and they are all 40-inch machines individually driven by General Electric motors designed for two-speed operation obtained by duplicate windings in each set of stator coils. Full electric control for each unit is provided.

Two molasses tanks of 90 cubic feet each, for first and second molasses, are supplied with direct-connected motor-driven Kinney molasses pumps. Magma pumps are motor-driven through gears.

### Miscellaneous Equipment

Bagging and weighing machinery includes a Richardson automatic bagging machine with motor control. The bags are closed with two motor-driven Union Special bag closing machines. Portable bag stackers are used in the sugar room.

Other equipment includes a 30,000-gallon high type tank for domestic water and a two 2,500-gallon soda tank with a motor-driven soda pump for cleaning out evaporators and pans. There is also a 3,000 gallon tank for hot water. Complete piping, valves and fittings were furnished by the Fulton Iron Works.

The machine shop has a 36-inch planer, a 4-foot radial drill, an 8-inch pipe machine and a 4-inch machine for the same purpose; a bolt cutter, two engine lathes, one 24 inches by 20 feet and the

other 36 inches by 8 feet; a motor-driven compressor with 100-cubic foot capacity; a stationary blast furnace and a large assortment of small tools. A 40-horse General Electric motor furnishes power for the shop. There is a two-ton ice plant made by the York Ice Machine Company.

Home for the employees are well-planned and laid out like a small model city in a grove of trees a short distance from the Central. The club house is a model of comfort and beauty.

This project, now completed, represents one of the very finest sugar factories in existence. No consideration of expense was allowed to interfere with the selection of equipment, the perfection of design or the efficient co-ordination of the machines. High efficiency and capacity with minimum expense and modern operating facilities have been the keynotes in the minds of the designers. The whole-hearted co-operation of the purchaser and supplier is everywhere reflected in the attractive location, symmetrical arrangement and the high standard of workmanship.

Irwin McNiece, sugar engineer for the Pacific Commercial Company, has been in general charge of planning and construction. Great credit must be given also for the inception of the development, to Don Carlos Ferrandiz and Sr. Adrian Got of the Management Corporation; to the Fulton Iron Works for the design and co-ordination of all the parts of the complete plant, and to Mr. James Ogg, the capable erecting engineer.

## Importation of Commercial Airplanes into China

### Commercial Attache Julean Arnold, Peking

Most of airplanes imported into China up to the present time have been in connection with military operations, in spite of the fact that they have figured to a very limited extent in the interior warfare that has been in progress in this country for some time. However, efforts have been made recently to establish commercial air services in certain restricted areas of the country, and for this purpose about 15 French planes have been imported into Canton. Commercial aeronautics is only at the inception of its development in China. It will be some time before it takes on a substantial growth, but gradually we may expect it to become a factor of importance in the internal transportation of this country.

### Need for Air Transportation Exists

China is so poorly equipped with modern means of communications that the country lends itself well to the development of aeronautics. For instance, the Province of Szechuan has a population estimated at 50,000,000 to 70,000,000 and still bears the unfortunate distinction of not having so much as a mile of railway. Motor transportation has been inaugurated in that Province in advance of the railway, yet there are no motor roads connecting Szechuan with any other section of the country. To send a letter from Peking to Chengtu, the capital of China's most populous Province, a distance by air of about 1,000 miles, requires about three weeks. To send a letter from Shanghai, the commercial capital, to Chengtu, also a distance by air of about 1,000 miles, requires from two to three weeks. It is patent, then, that a commercial airplane route between Chengtu and the other centers of population in China would serve a very useful purpose.

To reach Canton from Hankow, a distance by air of 530 miles, one may go overland only a portion of the way by rail and be obliged to use upward of a week for the journey. One may also proceed by steamer 600 miles down the Yangtze River and transfer to a seagoing vessel at Shanghai for Hong Kong, a distance of about 900 miles, thence up the Pearl River to Canton, utilizing in all from 7 to 12 days. Thus it is apparent that a commercial airplane route between Canton and Hankow would be very serviceable for passengers, mail, and valuable parcels.

### Commercial Airplanes Now Permitted to be Shipped

Until very recently the United States Government prohibited the exportation of all airplanes to China as being in contravention of the arms embargo agreement relative to the exportation of munitions of war to China. About two months ago the State Department ruled that the exportation of commercial airplanes to China would be permissible, but exporters will be obliged to secure export permits in each case from the State Department covering any such shipments.



# Japanese Government Railways

THE annual report of the Japanese Government Department of Railways for the year ending March 31, 1927, is of special interest at a time when the rehabilitation of its wrecked transportation system is the most difficult task confronting the new National Government of China.

If China is to place her Railway Department on a solid basis, she would do well to follow the example set by Japan by taking her railways out of politics and placing them in a water-tight compartment, safe from the interference of any other branch of the government. Much of the phenomenal success surrounding the profitable operation of the Japanese Government Railways, arises from the fact that railway finance is completely independent of the general budget and other State accounts. The Imperial Account Law creating this special position for the Railway Department, stipulates that all the capital expenditure for railway construction and improvement must be met from operating revenues. Only in the event that the railways show a loss and revenues are insufficient to cover new construction and maintenance, is the Department authorized to raise a public loan or incur any indebtedness and, all such obligations must be issued and secured as a charge on the special Railway Account.

## Mileage, Revenue and Expenditures

The mileage open for traffic on March 31, 1927, was 8,007, as against 7,837 the previous year, an increase of 170 miles. New lines under construction on this date, totalled 484 miles with another 2,474 miles authorized for construction. The Operating Revenues for the year totalled Y.484,082,956 and the Operating Expenses, Y.270,838,998, leaving a profit of Y.213,243,958. The percentage of Operating Expenses to Operating Revenues stands at 55.9 per cent. Analysis of the revenues show that Passenger receipts were Y.217,249,235, Goods Receipts, Y.205,078,520 and

Miscellaneous, Y.7,755,201. The Expenditures are classified as follows:

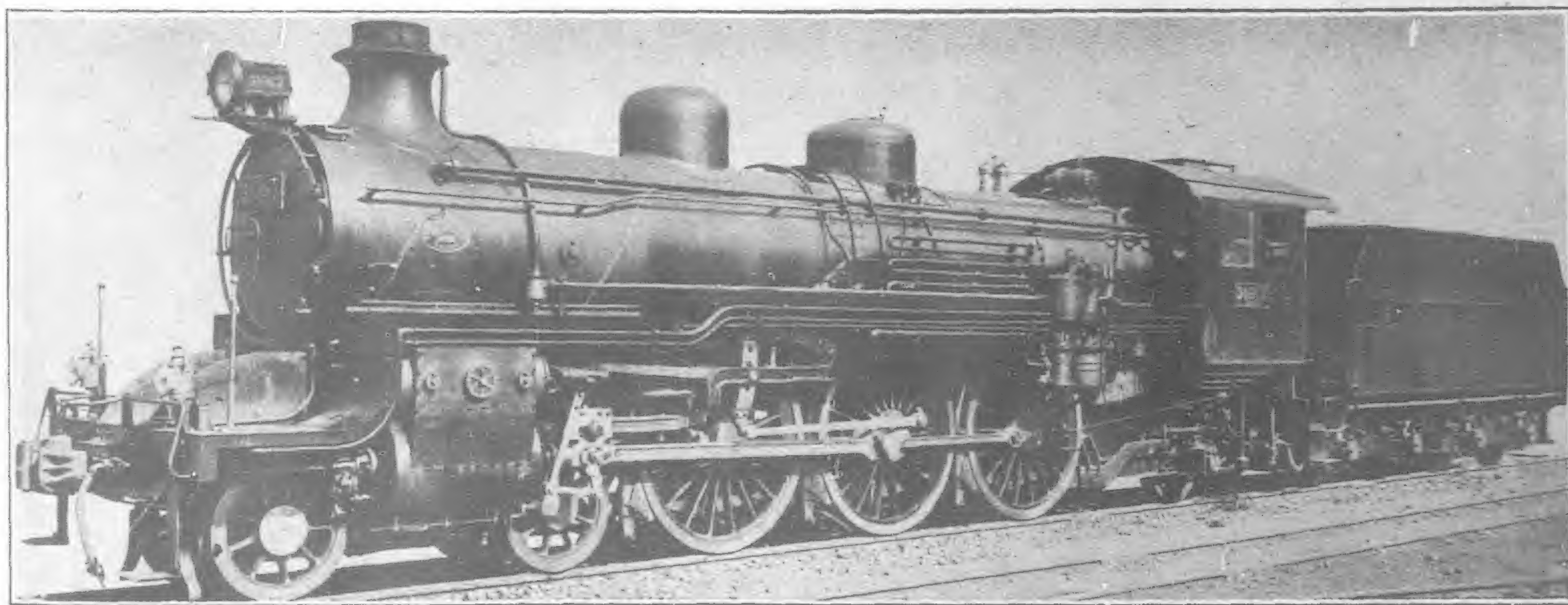
General	.. .. .	Y. 9,438,155
Maintenance	.. .. .	58,073,541
Transportation	.. .. .	75,711,517
Maintenance of Rolling Stock	.. .. .	27,522,795
Traffic	.. .. .	85,225,975
Hotels	.. .. .	361,311
Shipping	.. .. .	7,416,329
Hospitals and Dressing Rooms	.. .. .	2,826,221
Subsidy to Relief Association	.. .. .	4,233,156
Secret Service Fund	.. .. .	40,000
Total	.. .. .	Y.270,838,998

Out of the Gross Profit (Y.213,243,958) was paid the following charges:

Control of Private Railways and Survey	.. .. .	Y. 432,659
Expenses	.. .. .	5,442,502
Additional Work Expenses	.. .. .	71,139,015
Interest Charges	.. .. .	4,962,883
Subsidies to Private Railways	.. .. .	359,619
Balance on Suspense Account	.. .. .	

Balance, Net Profit .. .. . Y.130,097,279

The railway capital investment at the end of the year amounted to Y.2,688,669,616 and the Fixed Property aggregated in value, Y.2,647,453,213. In the purchase of Railway Stores, materials under contract for supply amounted to Y.174,078,627, of which Y.170,805,419 was expended for materials produced in Japan and Y.3,273,208 abroad. In other words, only 1.9 per cent. of



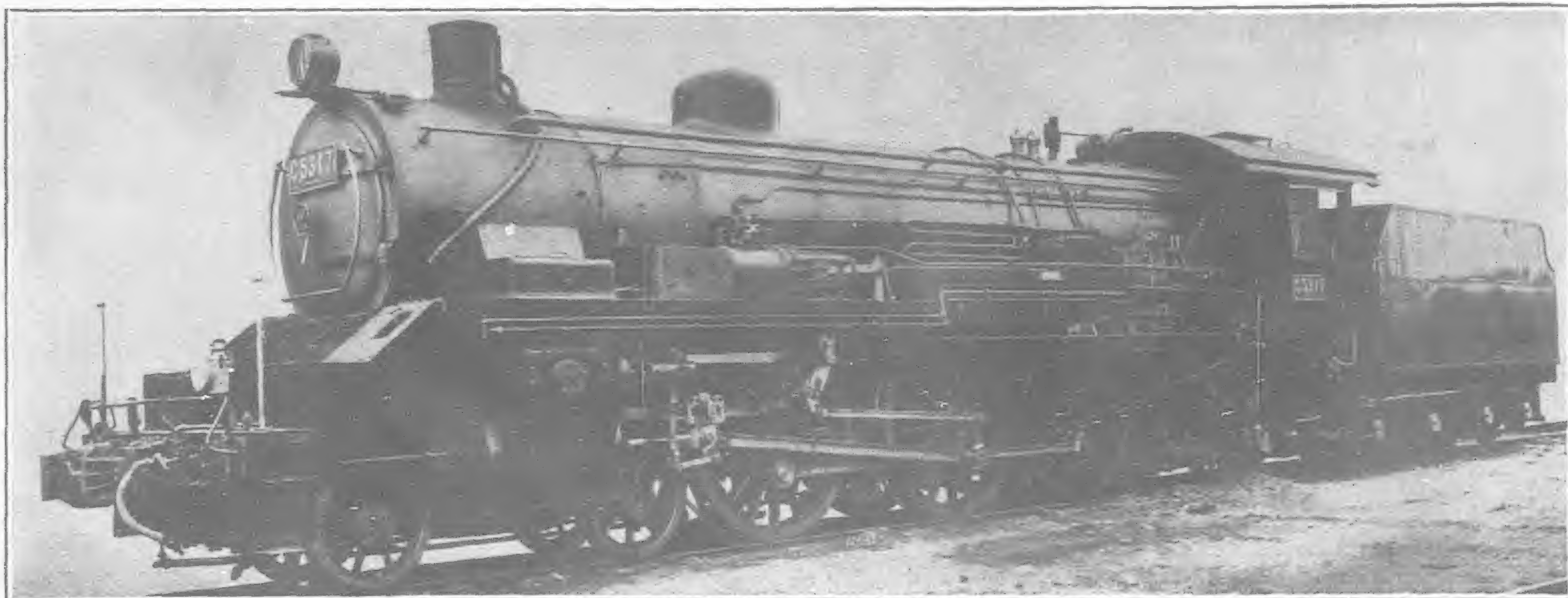
Type C-51: Locomotive on Imperial Japanese Government Railways  
2 CYLINDERS

Axle load (in working order)	..	6.63 t.	6.91	14.00	14.22	13.97	10.57	10.45	10.46	11.60	11.69
(empty)	..	6.38 "	6.54	12.30	13.24	12.83	9.19	4.89	5.02	4.66	4.63

17488 Total wheel base.

Cyl. dia. x stroke	..	530 x 660 mm.	Engine weight (working order)	66.3 t	Tender water capacity	..	17 m <sup>3</sup>
Boiler pressure	..	12.7 kg/cm <sup>2</sup>	Tender weight (working order)	44.2 "	Tender coal capacity	..	8.00 tonnes
Grate area	..	2.53 m <sup>2</sup>	Weight on driving wheels		Total length x width x		
Total heating surface	..	175.7 "	(working order)	..	height (engine and		
Super heating surface	..	39.9 "	Engine weight (empty)	..	tender)	..	19983 x 2700 x 3800 mm.
Total Evap. heating surface	..	135.8 "	Tender weight (empty)	..	Flues (dia. x length x No.)	..	140 x 5500 x 18 mm.
(tubes and flues)	..	124.4 "	Boiler water capacity	..	Tubes	..	57 x 5500 x 84 mm.
(fire box)	..	11.4 "					



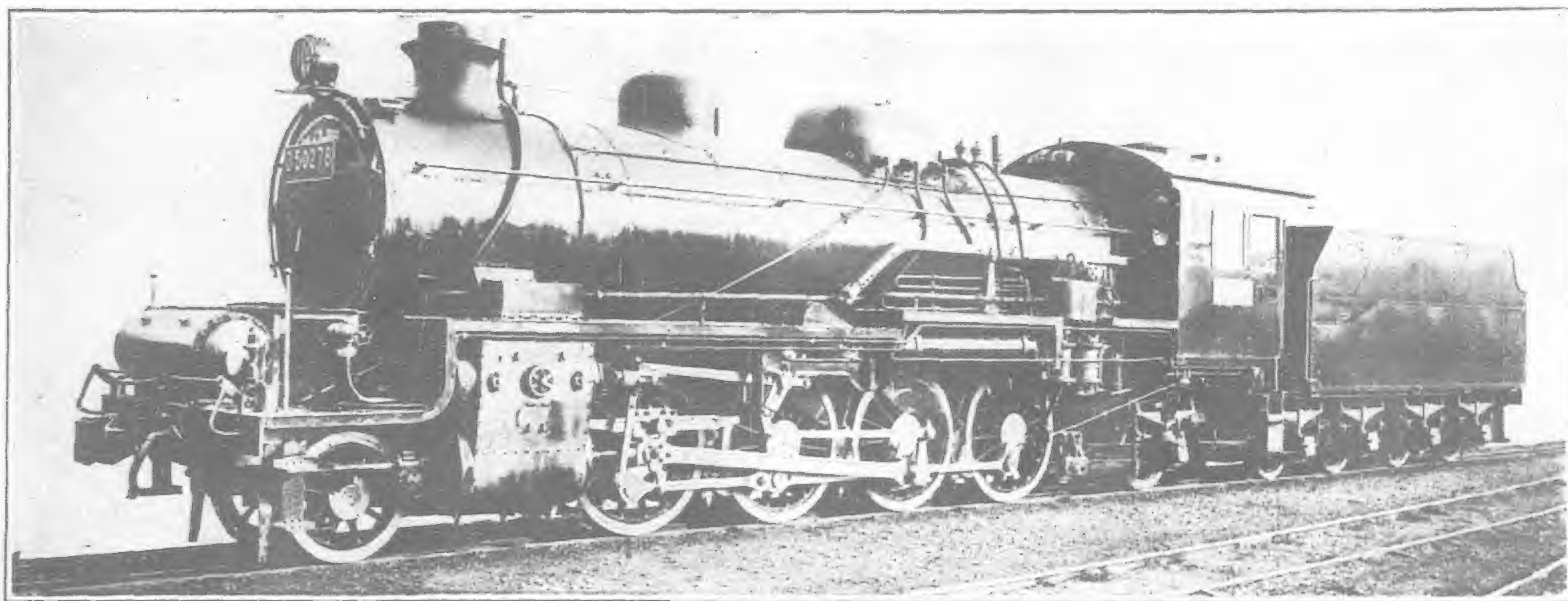


**Type C-53: Largest Locomotive for Passenger Service on Imperial Japanese Government Railways**  
3 CYLINDERS

Axle load (in working order) ..	9.68 t	9.73	15.41	15.42	15.44	15.30	12.12	11.72	12.54	12.62
(empty) .. ..	9.40 t.	9.37	13.99	14.20	13.25	12.67	5.18	4.78	4.91	4.93

17650 Total wheel base.

Cyl. dia. × stroke .. ..	450 × 660 mm.	Engine weight (working order) .. ..	80.98 t	Tender water capacity ..	17 m <sup>3</sup>
Boiler pressure .. ..	12.7 kg/cm <sup>2</sup>	Tender weight (working order) .. ..	49.00 "	Tender coal capacity ..	12.00 tonnes
Grate area .. ..	3.25 m <sup>2</sup>	Weight on driving wheels (working order) ..	46.27 "	Total length × width × height (engine and tender) .. ..	20625 × 2940 × 4000 mm.
Total heating surface ..	220.4 "	Engine weight (empty) ..	72.88 "	Flues (dia. × length × No.)	140 × 5500 × 28 mm.
Super heating surface ..	64.3 "	Tender weight (empty) ..	20.00 "	Tubes ..	57 × 5500 × 88 mm.
Total Evap. heating surface ..	156.1 "	Boiler water capacity ..	8.24 m <sup>3</sup>		
(tubes and flues) .. ..	139.2 "				
(fire box) .. ..	15.2 "				
(Arch tubes) .. ..	1.7 "				



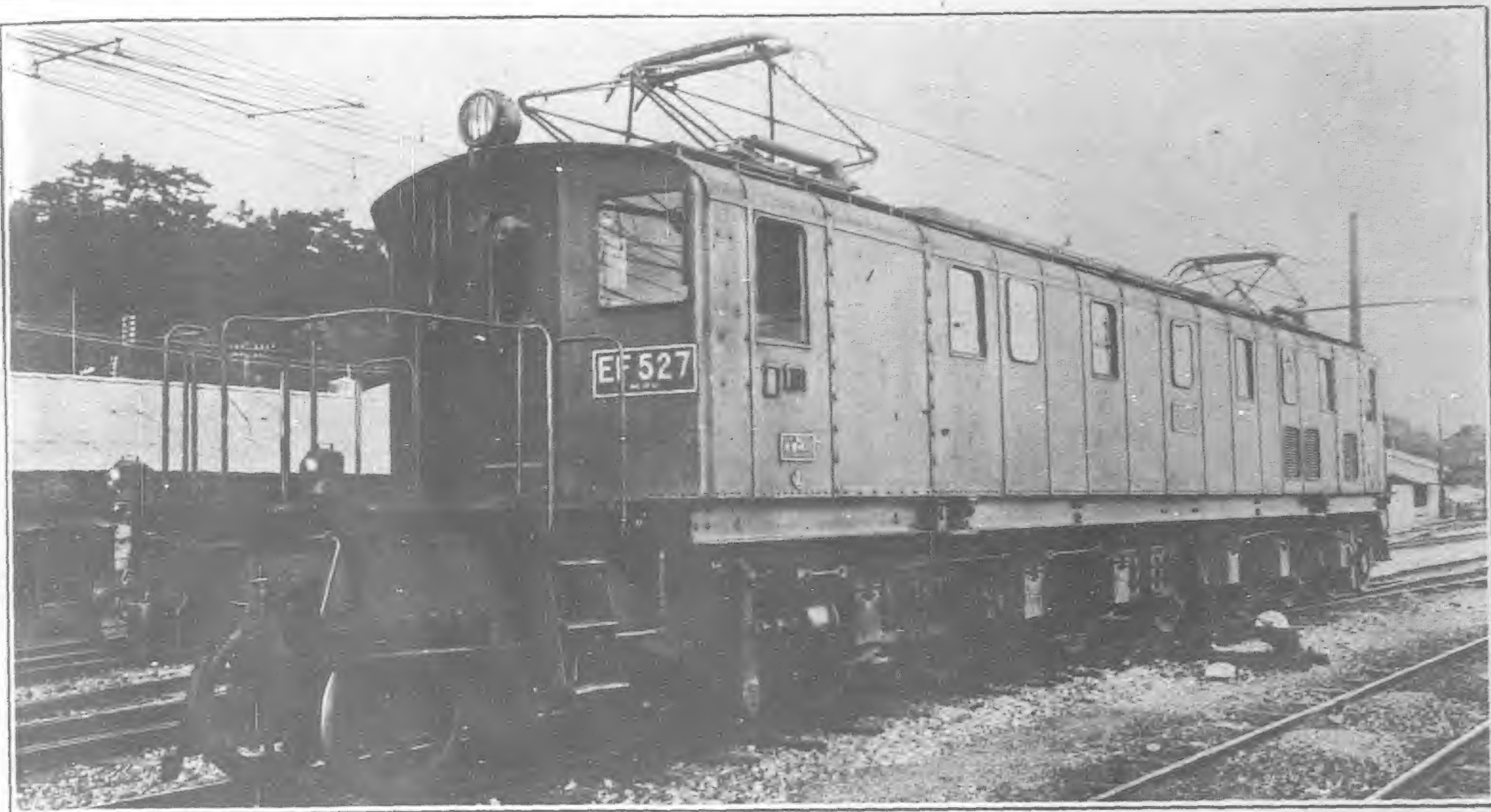
**Type D-50: Largest Locomotive for Freight Service on Imperial Japanese Government Railways**  
2 CYLINDERS

Axle load (working order) ..	8.54 t.	14.99	14.80	14.79	14.21	10.81	12.32	12.19	12.65	12.29
(empty) .. ..	8.08 "	14.07	13.85	13.03	11.84	9.49	5.33	5.21	5.39	5.11

17248 Total wheel base.

Cyl. dia. × stroke .. ..	570 × 660 mm.	Engine weight (working order) ..	78.14 t	Tender water capacity ..	20 m <sup>3</sup>
Boiler pressure .. ..	12.7 kg/cm <sup>2</sup>	Tender weight (working order) ..	49.45 "	Tender coal capacity ..	8.00 tonnes
Grate area .. ..	3.25 m <sup>2</sup>	Weight on driving wheels (working order) ..	58.79 "	Total length × width × height (engine and tender) .. ..	19991 × 2780 × 3955 mm.
Total heating surface ..	230.9 "	Engine weight (empty) ..	70.36 "	Flues (dia. × length × No.)	140 × 5500 × 28 mm.
Super heating surface ..	62.1 "	Tender weight (empty) ..	21.04 "	Tubes ..	57 × 5500 × 90 mm.
Total Evap. heating surface ..	168.8 "	Boiler water capacity ..	8.13 m <sup>3</sup>		
(tubes and flues) .. ..	155.3 "				
(and box) .. ..	13.5 "				





One of Seven Express Passenger Electric Locomotives, Type EF 52 Designed and Built at the Shops of the Imperial Government Railways of Japan

The electric locomotives of type EF52, used in express passenger service on Tokaido-line were designed by the Government Railways in co-operation with principal makers in Japan and built by these makers with common drawings. All seven locomotives were completed at the end of last year and have been engaged satisfactorily in regular service.

The locomotive is of articulated truck type with six driving axle, three axles for each truck, having a leading four-wheel truck of economy type at each end.

The description of the locomotive is as follows :

a. General description

Wheel arrangement	..	..	2CC2
Dia. of wheel	..	..	1250 mm.
Driving wheel	..	..	860 mm.
Leading wheel	..	..	860 mm.
Weight	..	..	108.0 tons
On driving wheels	..	..	80.4 tons

Power transmission

Single geared nose-suspension type

b. Main motor

No. of motor	..	..	..	..	..	6
Gear ratio	..	..	..	..	..	3.45
Terminal voltage	..	..	..	..	..	675 v.
One hour rating	..	..	..	..	..	370 amp.
Current	..	..	..	..	..	230 k.w.
Output	..	..	..	..	..	786
R.p.m.	..	..	..	..	..	

c. Locomotive

One hour rating

Output	..	..	..	..	..	1,350 k.w.
Speed	..	..	..	..	..	52 km/hr.
Tractive effort	..	..	..	..	..	9,500 kg.
Load	..	..	..	..	..	500 tons
Max. speed	..	..	..	..	..	95 km/hr.
Speed control	..	..	..	..	..	three stage control.

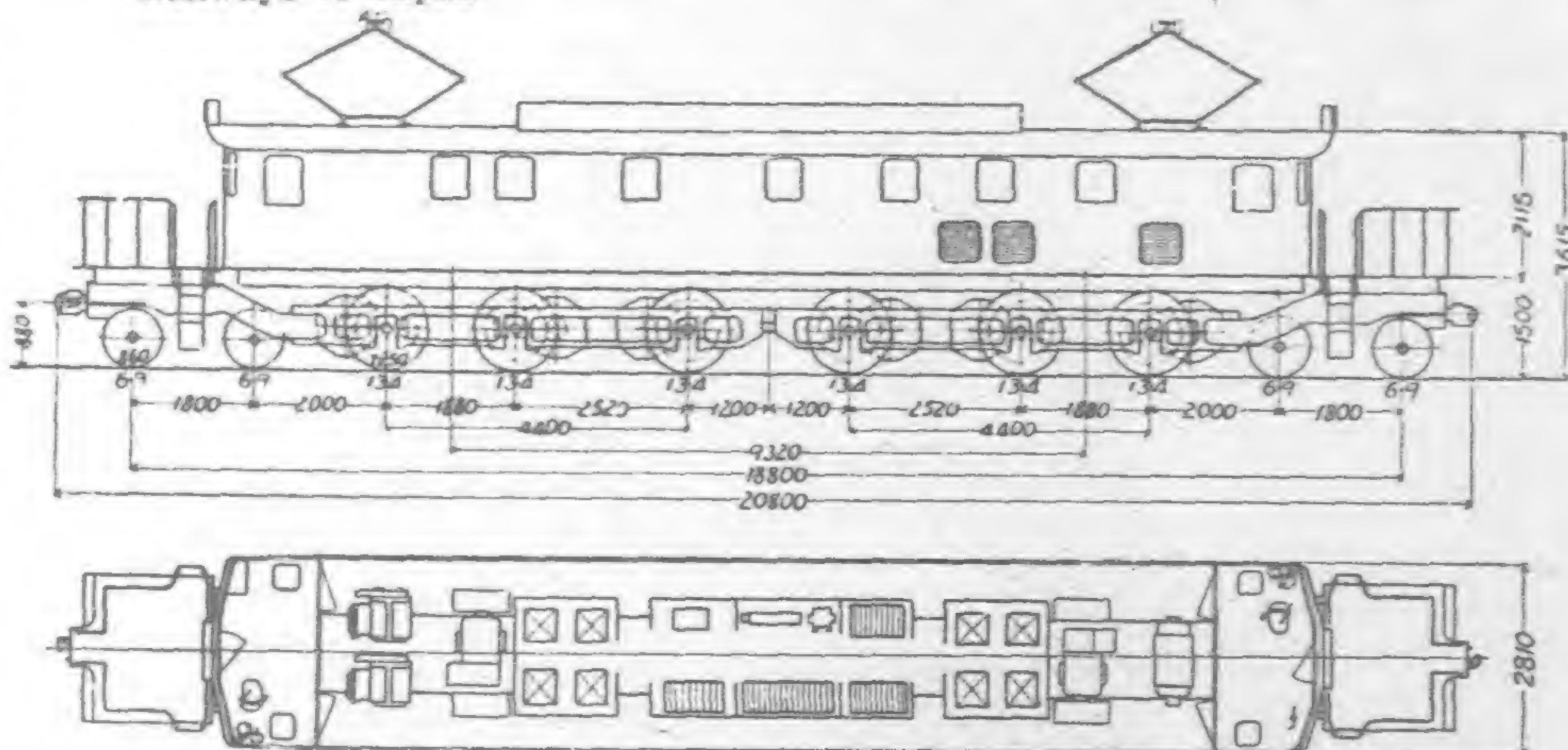
d. Auxiliary machines

	No.	Capacity	Motor output
Motor generator	..	..	..
Motor-driven blower	..	..	..
Motor-driven compressor	..	..	..
Motor-driven vacuum pump	..	..	..

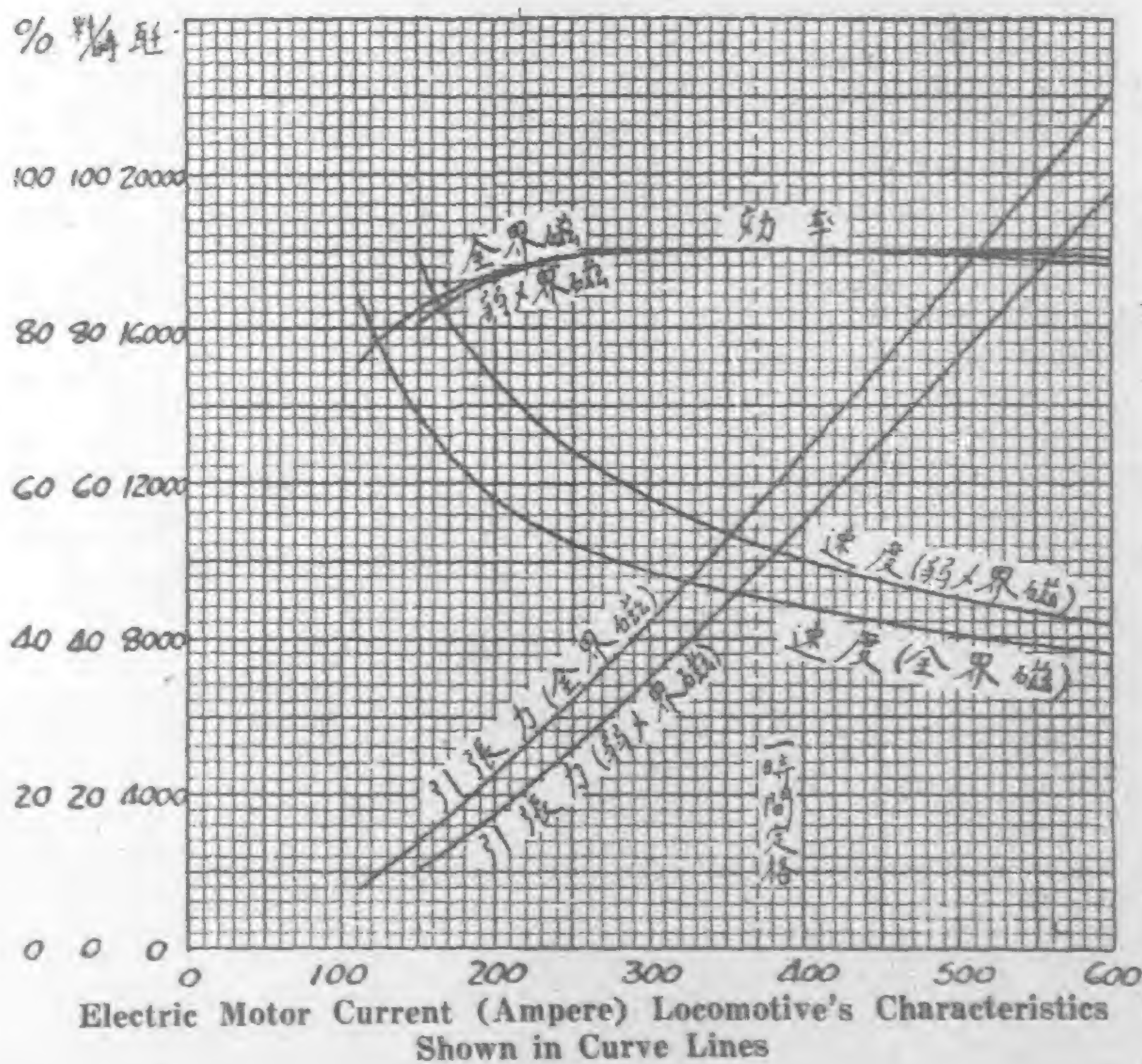
The power for low tension auxiliary circuits, including control and lamp circuit is supplied from the above motor generator and an ebora-tube battery of capacity 56 a.h. in four hour discharge is added as its spare.

The locomotive is equipped with air brakes of type EL-14, vacuum brakes and hand brakes.

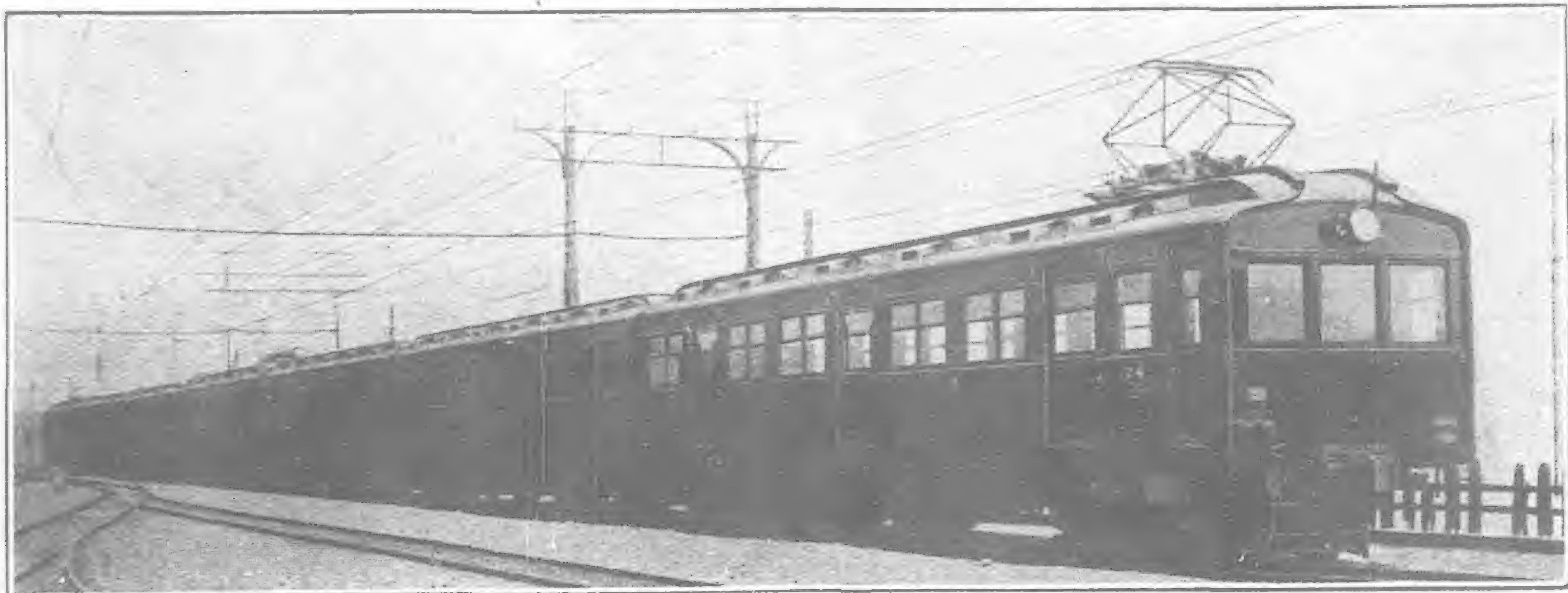
The general plan and characteristic curve of the locomotive are shown in Figs. 1 and 2.



Exterior of Locomotive







All Steel Car Electric Train for Suburban Traffic

the materials for the Japanese Government Railways was purchased from foreign manufacturers.

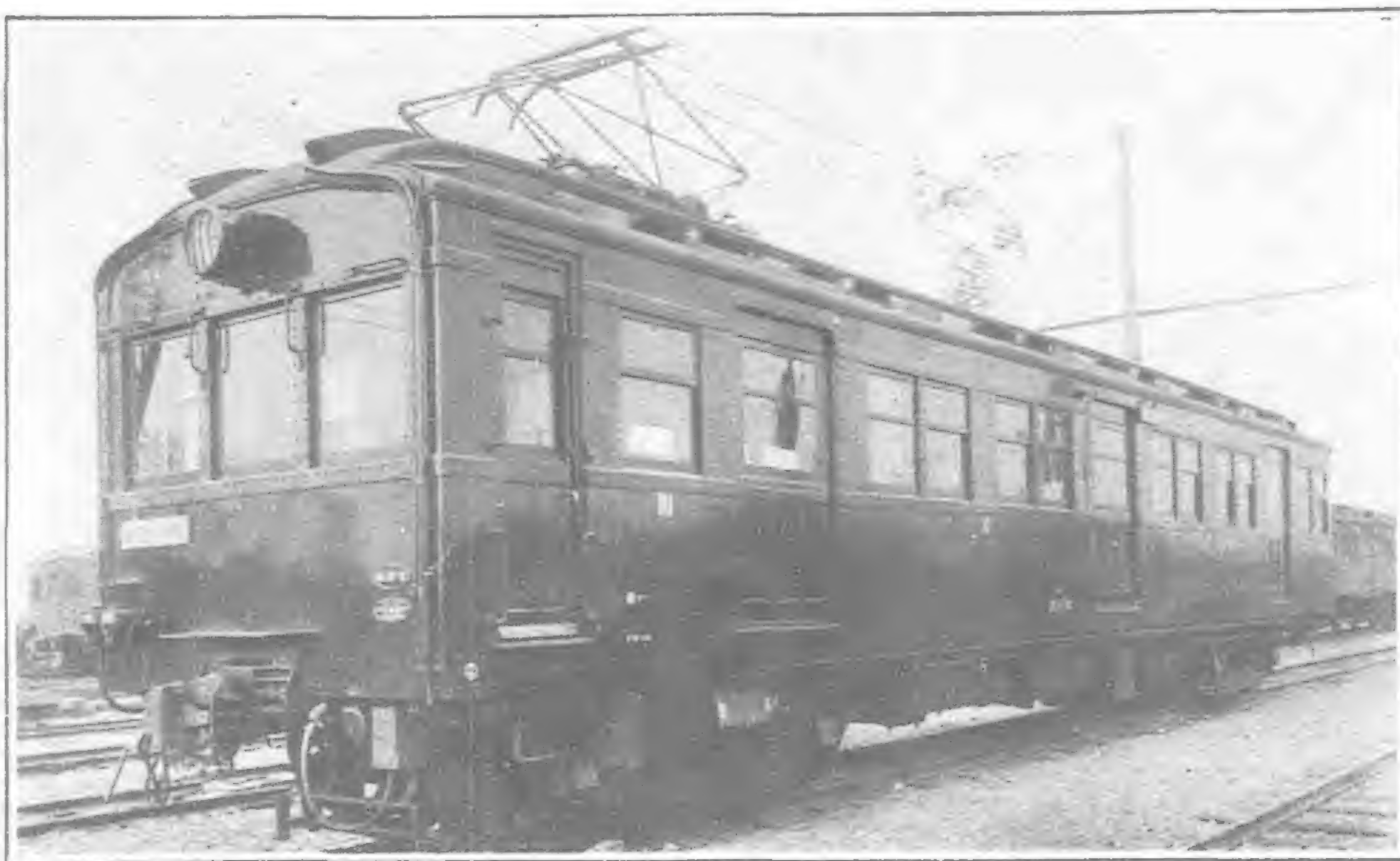
### 1929 Purchases

The Government Railway Department will spend about Y.19,000,000 during the fiscal year 1929 for rolling stock and other railway supplies. With the exception of some Y.4 to 5,000,000 bills which cannot be filled by home makers the above requisitions will be taken care of within the country.

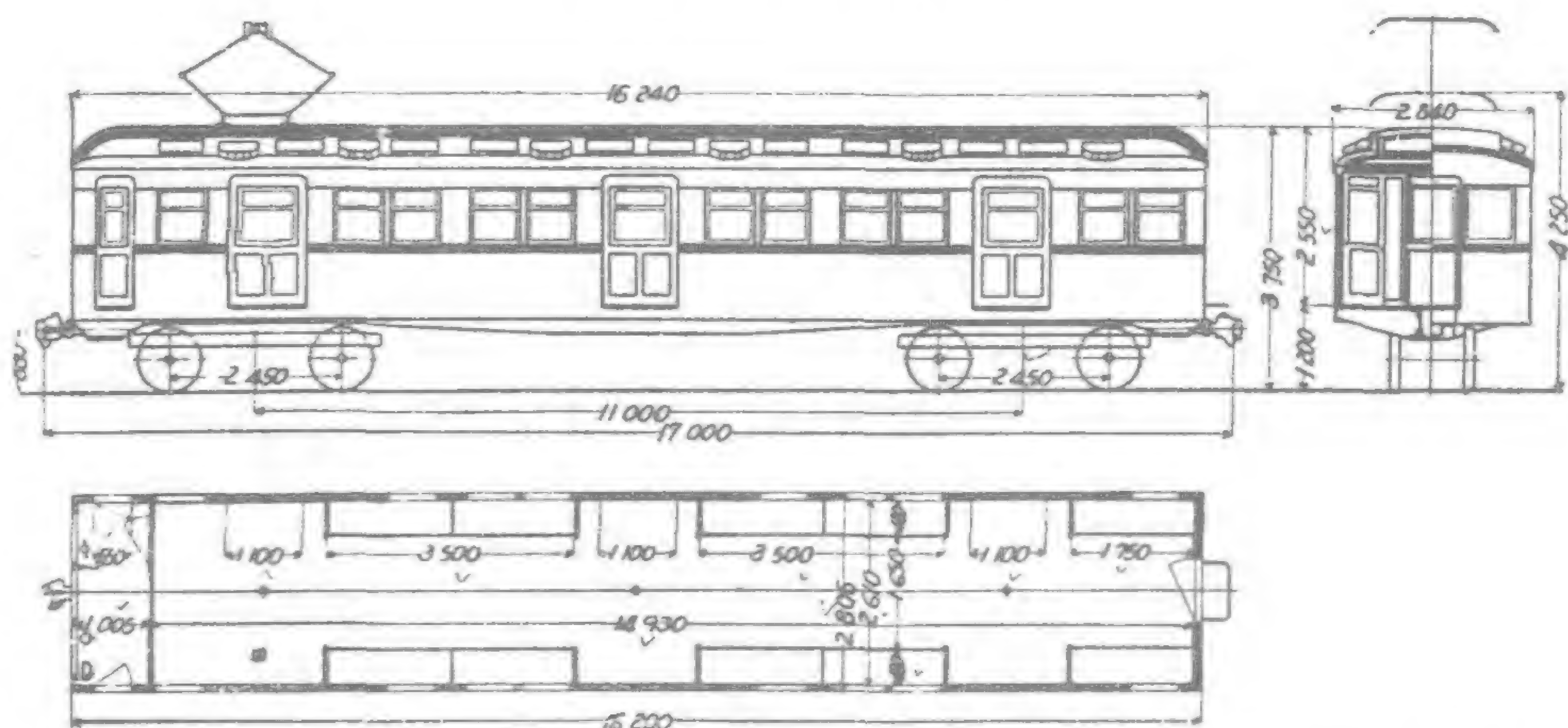
The railway authorities will spend some Y.13,000,000 for charcoal from China, Douglas fir lumber from North America and gasoline from various foreign sources for which Japanese substitutes are impossible to procure. The Y.19,000,000 requisition comprises the following steam locomotives Y.10,000,000; air brakes Y.1,500,000, steel tires for cars Y.2,000,000, car axles Y.500,000, car trucks Y.4,000,000, electric car motors Y.700,000 and electric locomotives Y.300,000.

### Revenue for 1928

The total income of the Department of Railways during the calendar year 1928, was Y.495,004,470, is an increase of Y.22,114,645 or 4.8 per cent.



Third Class Electric Car



Third Class Electric Car Used for Tokyo Suburban Traffic and Between Tokyo and Yokohama

Seating capacity	..	..	..	..	..	..	102
Seats	..	..	..	..	..	..	40
Own weight	..	..	..	..	..	..	40.1 tons
Line voltage	..	..	..	..	..	..	D.C. 1500 v.
One hour rating	..	..	..	..	..	..	
Output	..	..	..	..	..	..	400 k.w.
Tractive effort	..	..	..	..	..	..	3320 kg.
Speed	..	..	..	..	..	..	45 km/hr.
Max. speed	..	..	..	..	..	..	90 km/hr.
Gear ratio	..	..	..	..	..	..	25 : 63 = 1 : 2.52
Control system	..	..	..	..	..	..	Electro-pneumatic camshaft.
Control circuit voltage	..	..	..	..	..	..	D.C. 100 v.
Built	..	..	..	..	..	..	1927.

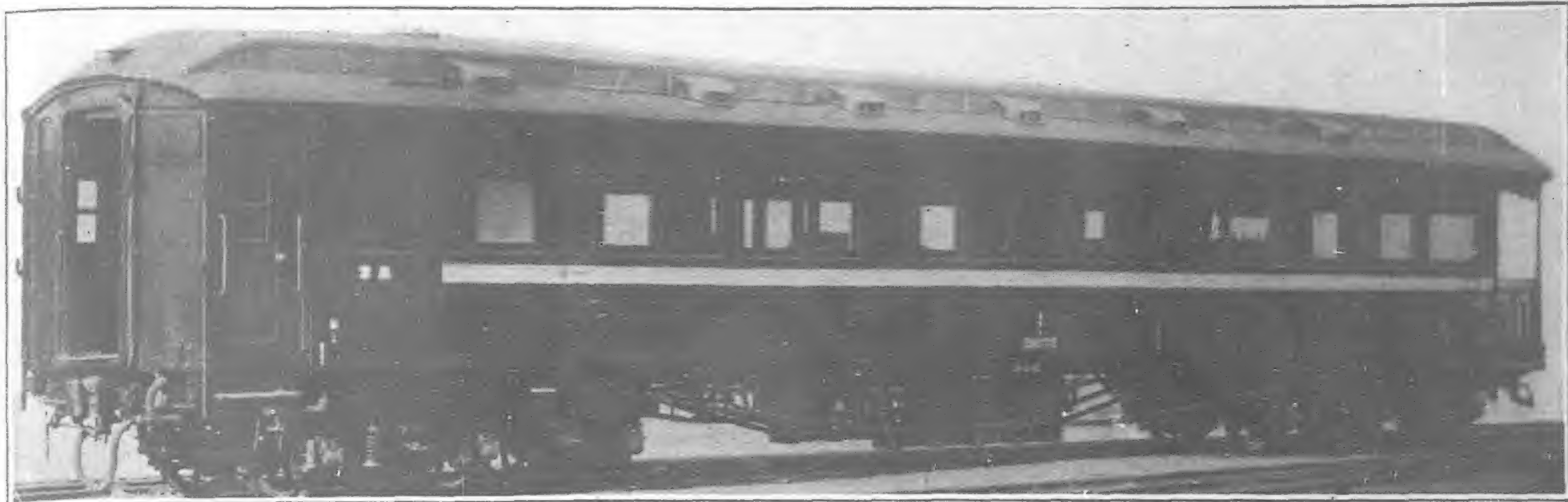
over the preceding year. Of this, Y.284,356,563 was passenger income, and Y.210,647,907 freight income. Increase in passenger income over 1927 was Y.12,161,037, while that in freight income was Y.9,953,608. The increase is principally attributed to new lines opened during the year.

### Rolling Stock

The number of locomotives on March 31, 1927, was 3,965 with an aggregate weight of 285,988 tons, consisting of 3,876 steam locomotives with an aggregate weight of 280,585 tons and 89 electric locomotives with an aggregate of 5,403 tons, an increase of 46 locomotives and 747 tons in weight over the preceding year. Of the total number of steam locomotives, 2,211 are Superheated. The 89 electric locomotives are all in service in the Tokyo Region.

The number of Passenger carriages aggregated 10,058 with a seating capacity of 558,605, consisting of 6,931 bogies, 2,289, 4-wheeled, 822 electric cars and 16 motor carriages. The number of Goods Wagons in service was 61,897, representing a loading capacity of 774,748 tons, consisting of 33,691 covered wagons representing 392,079 tons, 22,529 uncovered





First Class Parlor and Observation Car, Exterior and Interior Views

wagons representing 288,908 tons and 5,677 coal trucks, representing 93,761 tons.

In the 4,002 additions to the rolling stock for the year under survey, it is interesting to note how far Japan has advanced in supplying her own railway requirements. The number of new steam locomotives added during the year, totalled 135, aggregating 11,142 tons. Of these, 131 were made at home, only four being purchased from foreign countries. Twelve electric locomotives aggregating 741 tons were added, only two being purchased from foreign makers. Of the 583 passenger coaches added to stock, 47 were made at the Railway Workshops and 536 at private works. The 89 electric coaches were mostly all made by private shops, while of the 2,498 new goods wagons, only 25 were made at the Railway Shops and 2,471 by private companies.

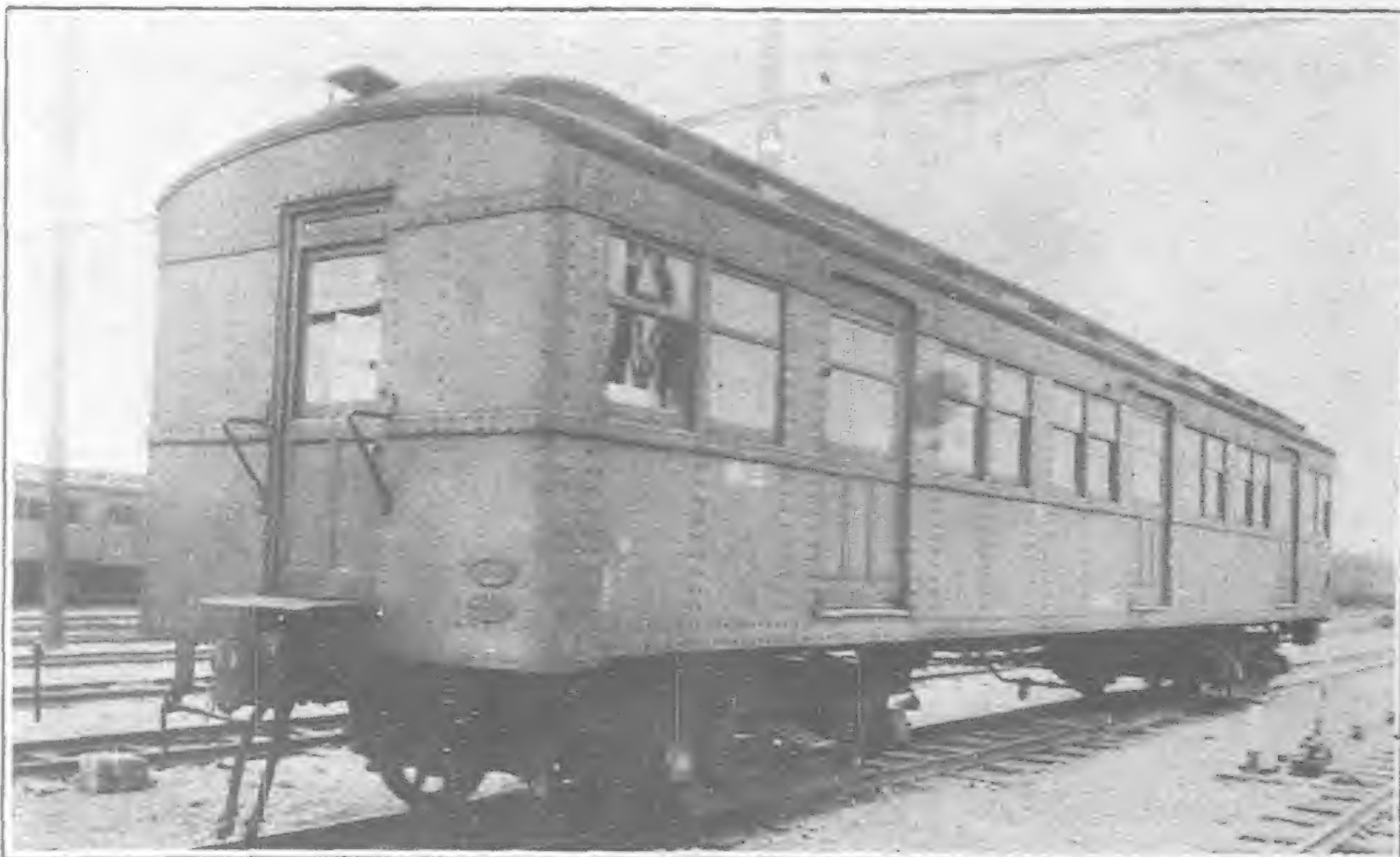
#### Special Improvements

One of the interesting features of the new railway program inaugurated

during the year under review, was direct rail connections with food-producing centers and distributing markets, in order to reduce the cost of food stuffs. One of the difficulties experienced in the distribution of the food supply of Japan has been in the conveyance of vegetables during the winter season from Hokkaido and Northeastern Japan to the dense population centers of Tokyo and Osaka. To meet this situation, the Railway Department reconstructed a number of freight cars so as to maintain a constant

moderate temperature while transporting these perishable goods. The results were so favorable that it is now being extended. The addition of 250 refrigerator cars, 150 ventilating cars of a new type, cattle and milk vans, are all part of the general scheme of improving the service for the transportation of food products.

Another feature of the year was the installation of loading machines. Heretofore, the handling of railway cargo has been carried out by workmen but to effect speedier and safer handling of bulky goods, labor saving



Third Class Trailing Car Used for Suburban Traffic



machinery has been provided for certain stations. During the year, 64 sets of such machines, embracing cranes, elevators, conveyors, telfers and the like, were installed. The Railway Department is also equipping all the cars in service with air brakes. At the end of the year, altogether 2,399 locomotives, 762 carriages and 60,267 goods wagons were equipped. This means that 97 per cent. of all the goods wagons in service are now equipped with air-brakes. During the year under review, 577 sets of arm type automatic signals, 892 sets of colored-light signals and 43 sets of position light signals were installed. Within the past year, the Railway Department has experimented with 3,000 iron sleepers on the Fuji-Susono section of the Main Tokkaido Line and have now decided to replace the wooden sleepers on all the main lines. Reports state that the Department has sent engineers to the Anshan Iron and Steel Works of the S.M.R. to investigate and report on the cost of production for an immense tonnage of sleepers from this concern.

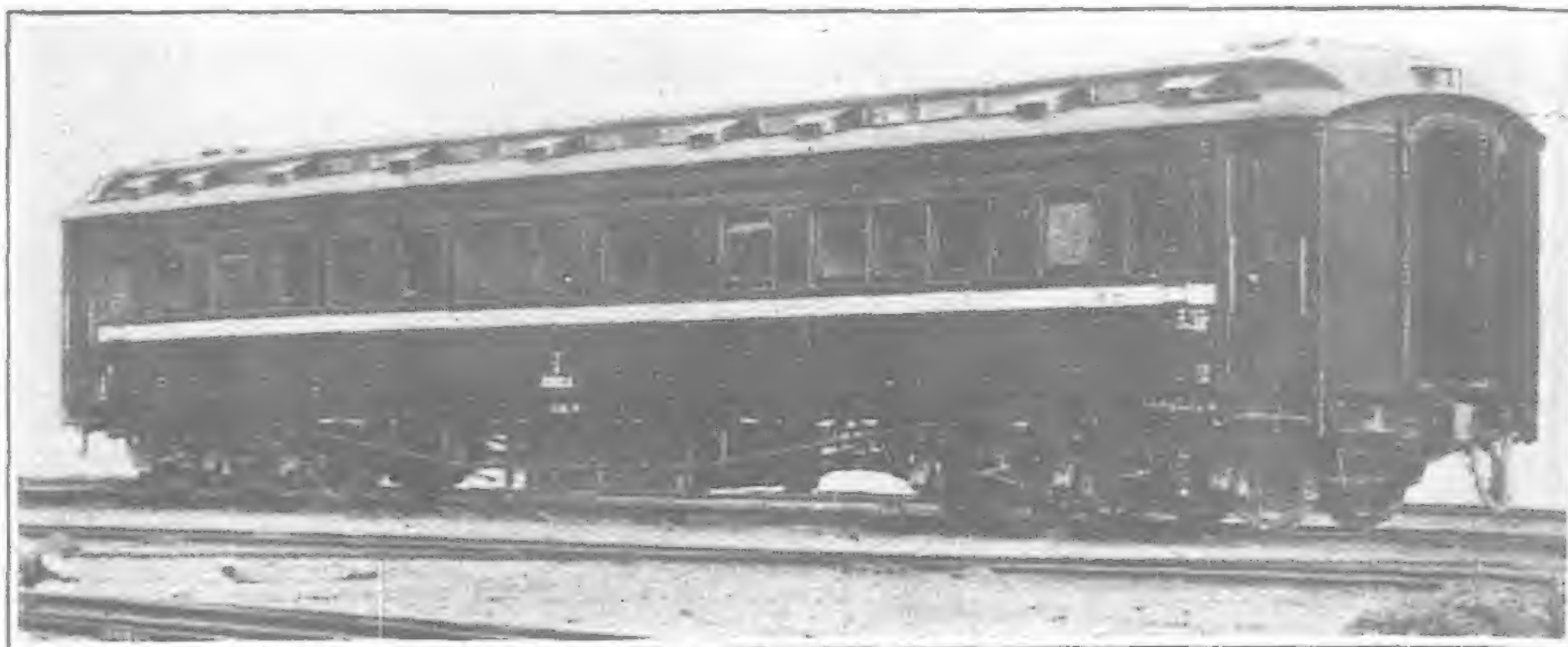
### Electrification

On March 31, 1927, the Railway Department operated eight power stations and 37 transformer sub-stations, distributed as follows: Power Stations; Akabane, Yokokawa, Hamamatsu, Suida, Takatori, Shimonoseki and Sandaigawa on the Main Island and the Muroran station in Hokkaido.

Transformer Sub-stations: On the Main Island, Eirakucho, Shiodome, Oimachi, Oi Works, Kamakura, Kawasaki, Okubo, Ueno, Tabata, Omiya, Koriyama, Maruyama, Yagasaki, Nagoya, Ofuna, Ninomiya, Kanagawa, Nagano, Kyoto, Himeji, Minatomachi, Osaka, Okayama, Horoshima, Take Works, Tsuchisaki.

Kyushu Island: Moji, Kokura, Tobata, Nagasaki, Wakamatsu, Wakamatsu Works.

Hokkaido: Asahigawa, Naebo, Kushiro.



First Class Sleeping Car

Altogether there were 14 prime movers representing 30,992 h.p., 201 dynamos and converters representing 108,114 k.w. and 186 transformers representing 116,754 k.v.a.

The length of lines for power transmission measured 5,290 meters with a wire length of 14,609,441 meters and 124,125 posts. The number of electric motors for electric car propulsion numbered 1,404 representing 127,800 k.w. The number of electric motors for operating electric locomotives came to 318 with an aggregate capacity of 69,196 k.w.

### Workshops

The Railway Department operates 21 work shops and four detached plants, located as follows:

Tokyo Region:—Omiya Works, Oi Works, Kinshicho Works.

Nagoya Region:—Nagoya Works, Hamamatsu Works, Nagano Works, Kanazawa Works.

Kobe Region:—Takatori Works, Suita Works, Goto Works.

Moji Region:—Shimonoseki Works, Kokura Works, Wakamatsu Works, Ta Take Works.

Sendai Region:—Koriyama Works, Morioka Works, Tsichisaki Works.

Sapporo Region:—Naebo Works, Goryoku Works, Asahigawa Works, Kushiro Works.

Detached Plants:—Sumidagawa (Tokyo Region), Tokushima, Tadotsu (Kobe Region) Wanishi (Sapporo Region).

During the year 3,828 steam locomotives, 92 electric locomotives, 486 carriages, 1,312 electric cars and 77,829 wagons were passed through the works, while 4 steam locomotives, 10 electric locomotives, 47 passenger coaches, 6 wagons were newly made and 60 electric cars were equipped with electric gears. It is interesting to note that the ten new electric locomotives acquired during the year, were built at the Government Railway Workshops and not by private builders.

### New Osaka Freight Service

Of the many improvements being carried out by the Railway Department, the erection of

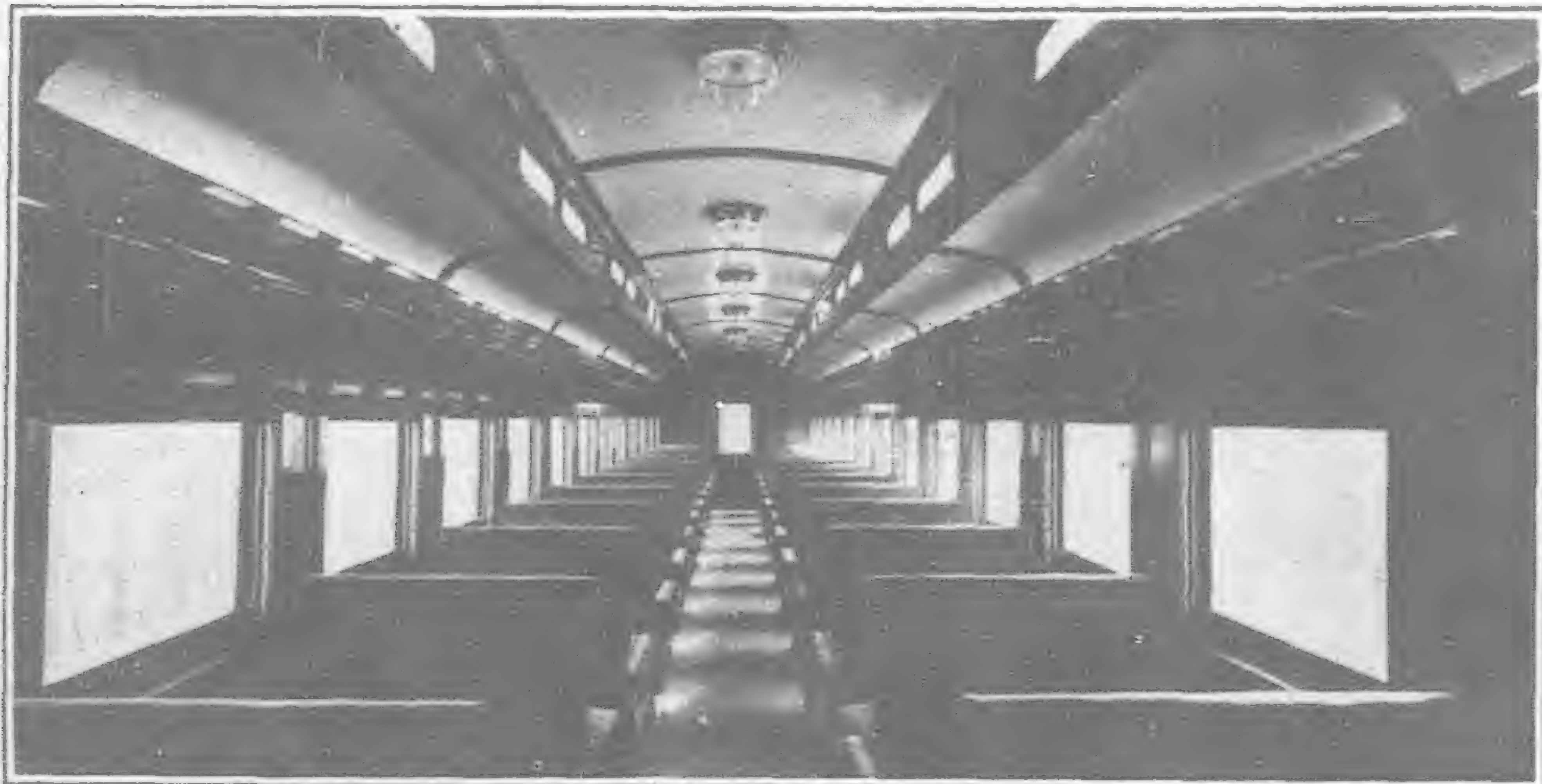


Drawing Room



Compartment

First Class Sleeping Car

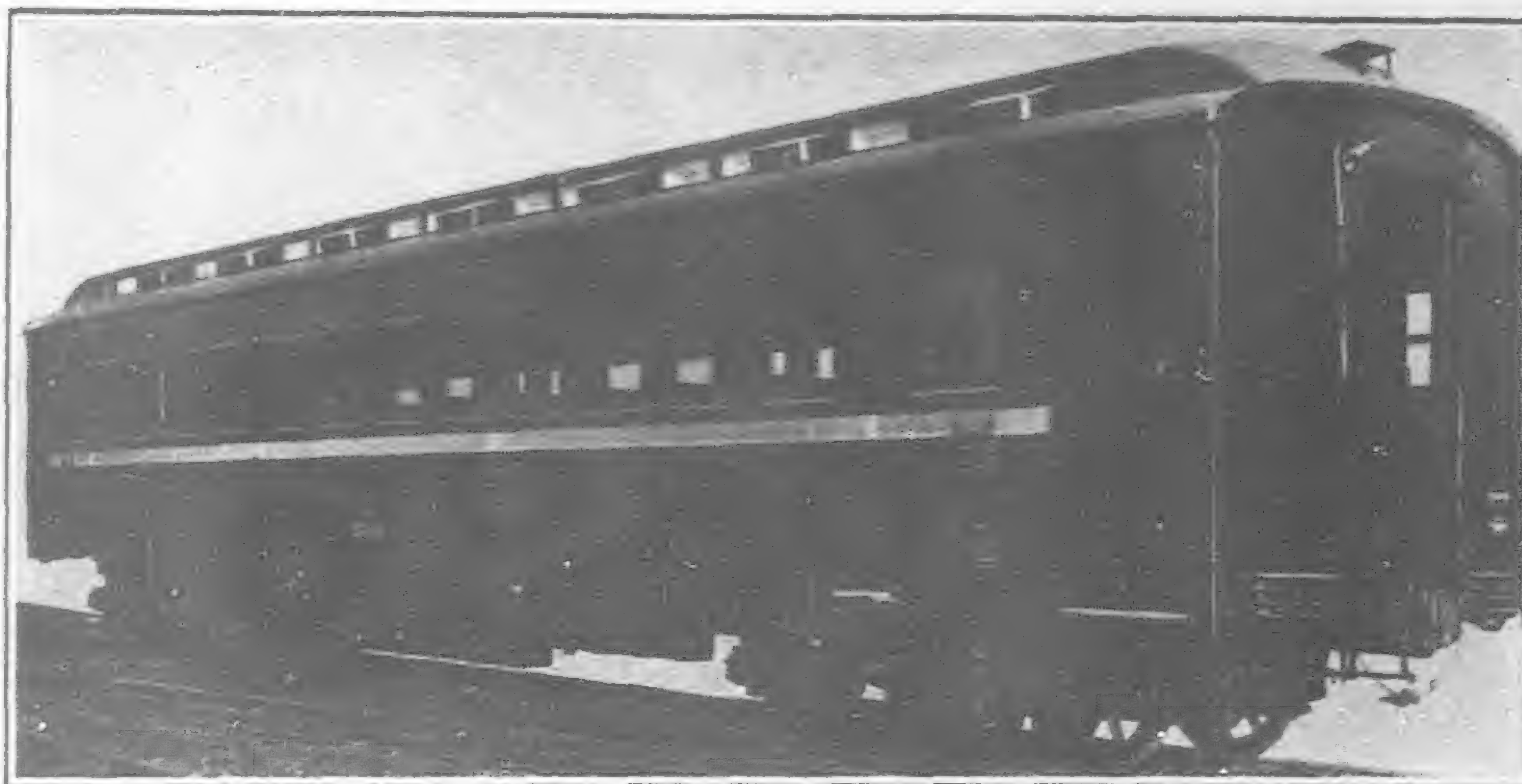


Interior of Second Class Passenger Coach



new stations and extension of freight yards and terminal facilities are amongst the most important. An extensive plan for handling the heavy freight business of the great manufacturing city of Osaka is now completed. The outstanding features of this plan embrace what is known at the Osaka Freight Service Line starting from the Miyabara station to the new freight yards of the Greater Osaka Station and, the Osaka Port Service Line, connecting the heart of the city with the port at Chikka. In addition, the so-called Joto Freight Line between Suita to Hanate has been practically completed. The completion of these three freight service lines are part of a comprehensive plan of carrying passengers and freight by separate tracks. Osaka handles about 13,000,000 tons of freight annually and hitherto passengers and freight have been disposed of on the same tracks, causing serious congestion at the main station. With the completion of the above plan, the greater part of Osaka's railway freight will be taken to Suita and from there distributed and, when the Joto Freight Line is opened, the traffic between Osaka station and the port will be handled entirely by this line.

The Osaka Freight Service Line with its splendid up-to-date freight yards and station, has cost the Railway Department Y. 35,000,000. The yards and station cover 65,000 tsubo, a little

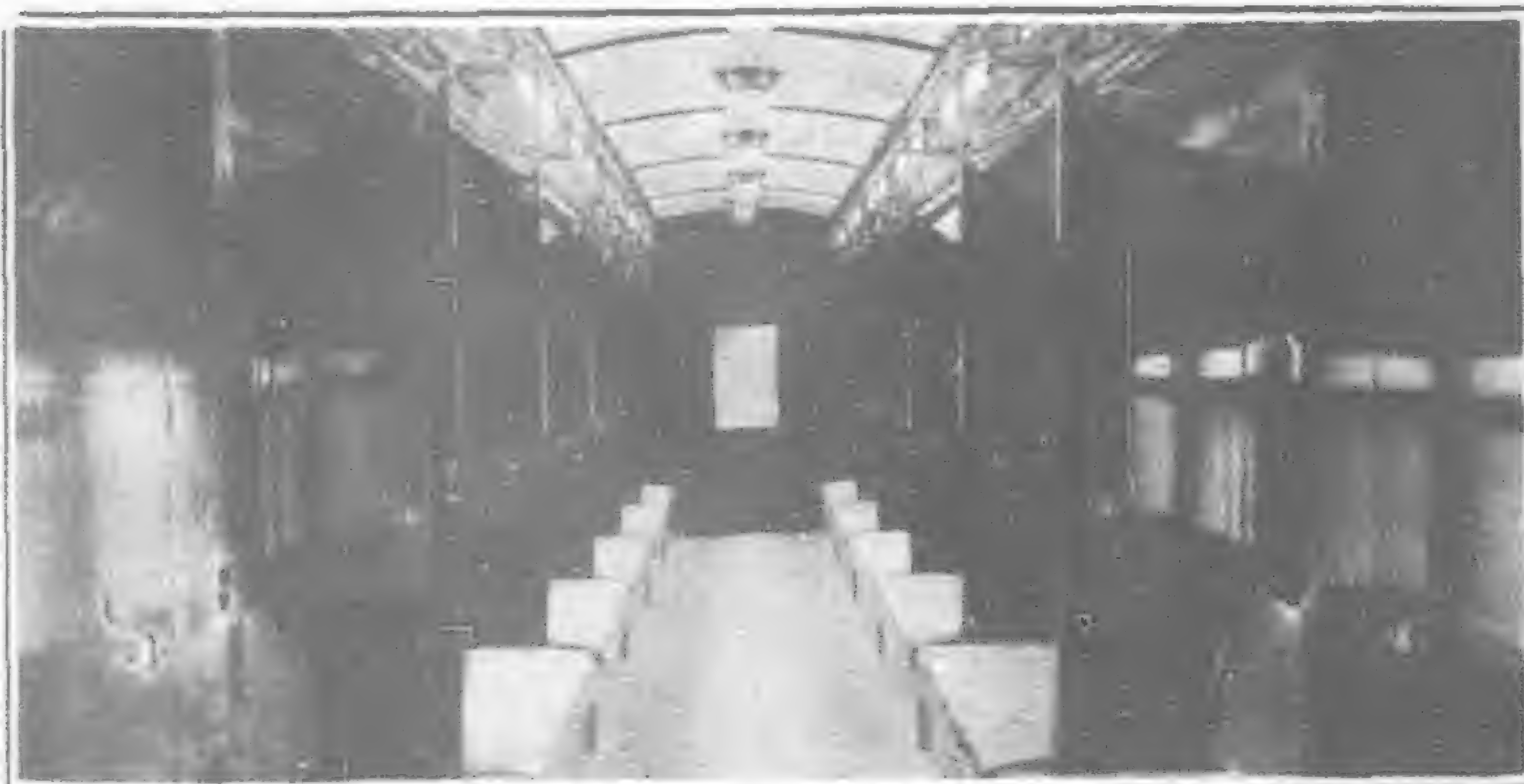


Type 4-W-B. Second Class Passenger Coach

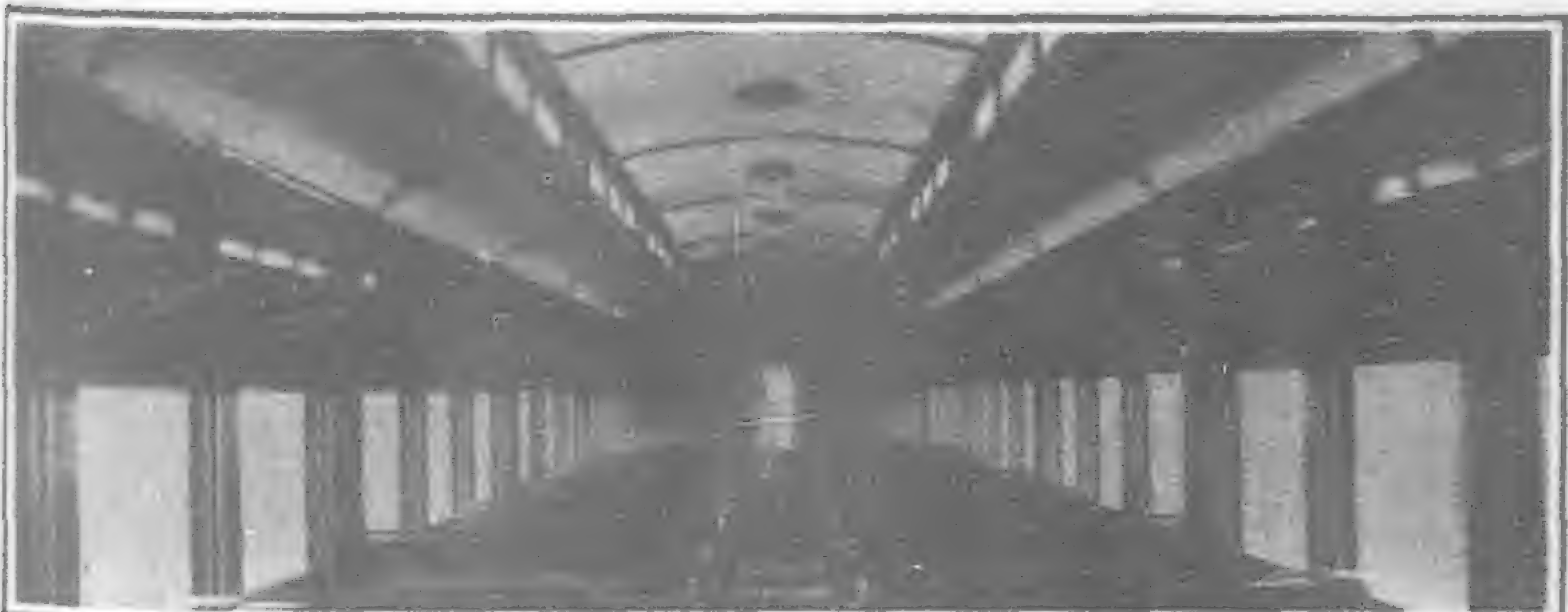
The Osaka Port Freight Line from Imamiya to Chikka, cost over Y.12,000,000, which was jointly borne by the Railway Department and the Osaka Municipality. It was opened to traffic on December 1, 1928. The line is said to be the best equipped of its kind in Asia. The port of Osaka has long been inconvenienced by the lack of rail communication with the industrial districts of the city, the entire import and export trade of the port being carried from the docks by lighters and barges and distributed by means of the many rivers and canals that intersect the district. The

new line starts from Imamiya and terminates at the O.S.K. wharf, a total length of 8 miles, including over 2 miles of sidings.

The line is partly elevated. The terminal at Chikka will be called the Osaka Port Depôt. The line will be able to handle 700,000 tons of freight with 200 freight cars, nearly trebling the

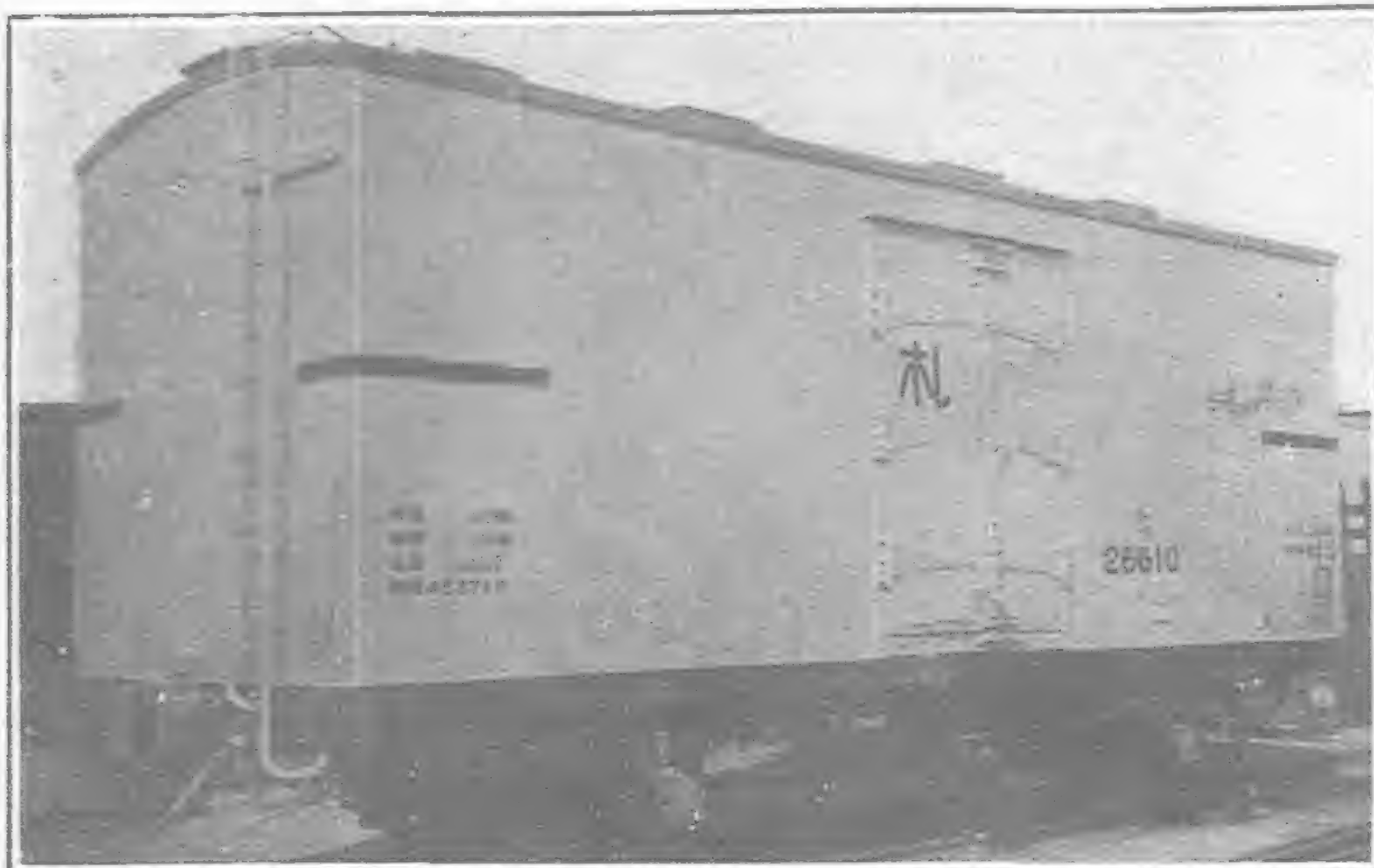


Exterior and Interior of Second Class Sleeping Cars

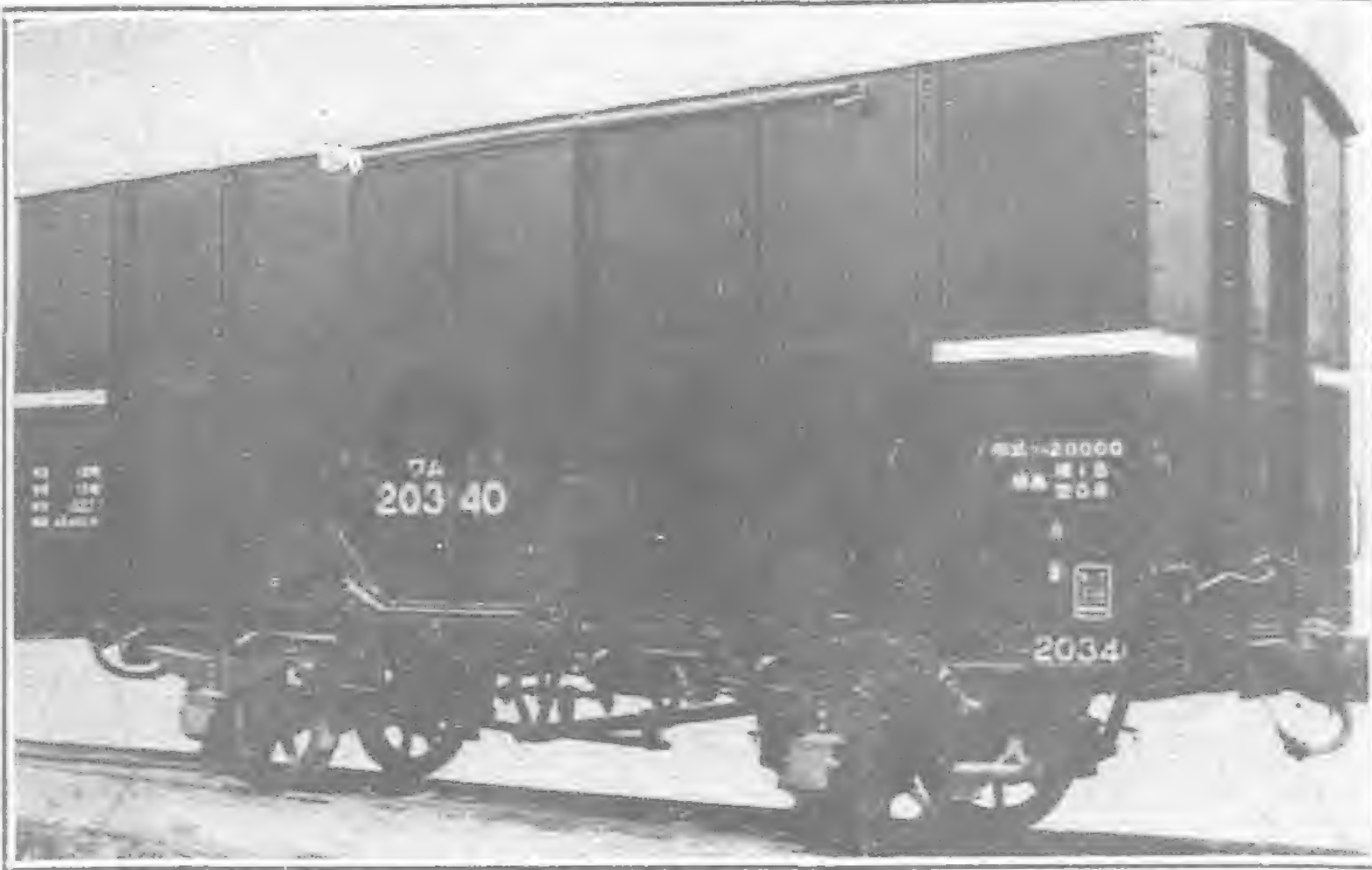


Exterior and Interior of Third Class Passenger Coach





12-Ton Refrigerator Car

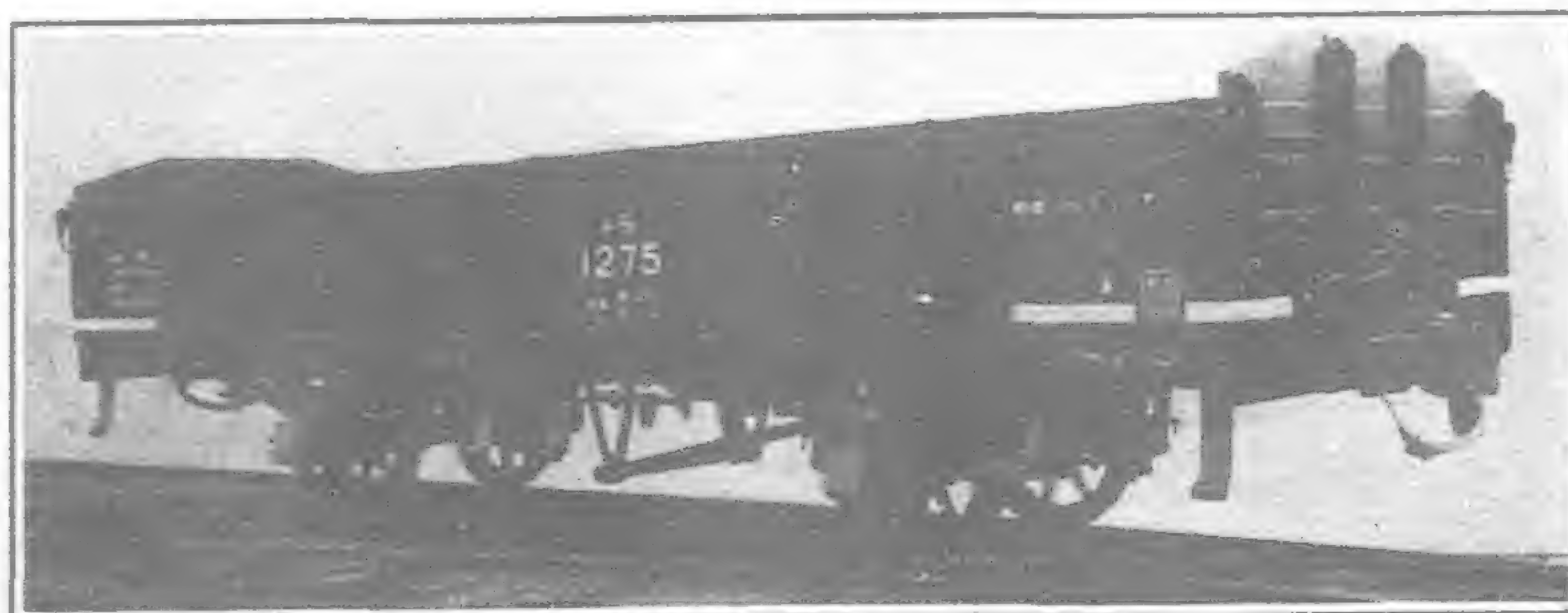


15-Ton Box Car

amount of freight hitherto handled at this terminal.

A special article from our Correspondent in Osaka on the State Railway Lines in the Osaka District appears in this issue.

A similar improvement has also been made at Kobe where an extension of the main line has been brought into the Harbor compound.



17-Ton Open Car

### New Stations

The new Yokohama railway station erected at a cost of Y.1,200,000, was recently opened. It is a magnificent steel frame and reinforced concrete structure covering 250 tsubo of ground. Other new stations with their cost, include the following:

1. Shinagawa terminal; cost Y.3,200,000; completion in 1933.
2. Tsurumi terminal; cost Y.3,480,000; completion in 1930.
3. Shiodome freight station; cost Y.3,318,000; completion in 1933.
4. Tabata terminal; cost Y.2,625,000; work to be finished in 1931.
5. Omiya terminal; cost Y.100,000; work to be finished in one year.
6. Akihabara station; cost Y.4,920,000; completion in 1930.
7. Ueno station; cost Y.5,230,000; completion in 1931.
8. Oji station; cost Y.50,000; work to be finished in one year.



New Station at Yokohama

9. Akabane station; cost Y.202,000; work to be finished in one year.

10. Toyamagahara terminal; cost Y.4,490,000; work to be finished in 1933.

11. Koiwa terminal; cost Y.258,000; work to be finished next year.

12. Kameido station; cost Y.400,000; to be completed in one year.

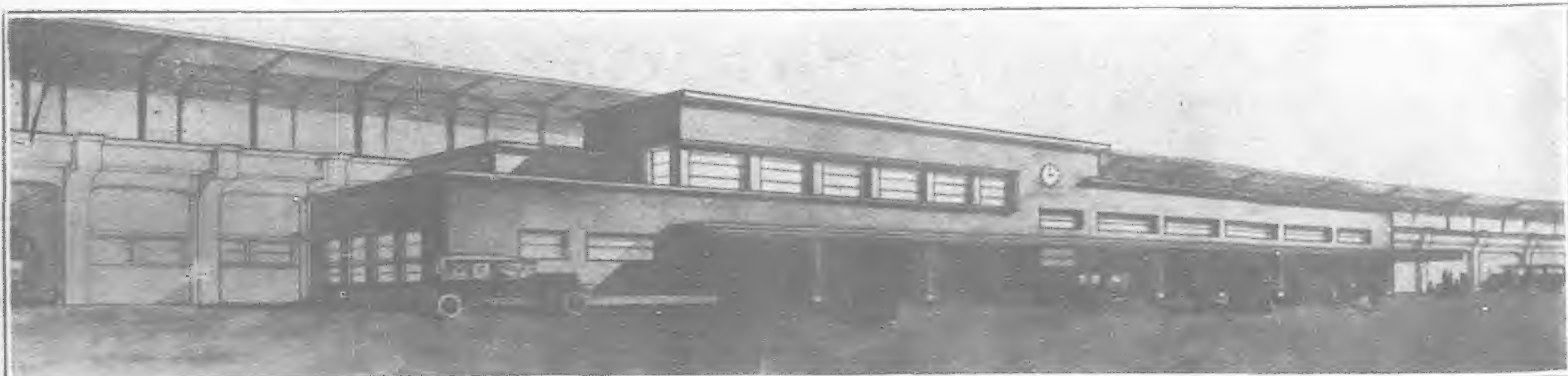
13. Onakigawa station; cost Y.80,000, to be finished in one year.

14. Other stations with a total cost of Y.10,628. To be finished in 1931.

### New Electrification Program

The electrification plans of the Railway Department are being constantly modified or added to. An announcement early last year, gave the cost of new electrification plans at Y.20,000,000 spread over a period of four years. Since then, the Department has announced a program for the electrification of nine sections of five

trunk lines at a cost of Y.40,000,000 spread over a period of six years. The new plan to go into effect next year is to electrify all of the sections of the railway throughout the country that are spotted with tunnels or heavy grades and is the result of long studies, the project being based upon the original purpose to electrify all trunk lines situated near large cities. The different sections



Type of Concrete Elevated Track Construction Through the City of Kobe and Station at Hyogo, Under Construction



affected by the plan with their respective estimated costs are as follows :

Section	Trunk Line	Estimate (000 omitted)	Completion Construction Period
Tottori-Toyooka, Sanin	.. ..	.. Y. 3,880	1934
Maibara-Imajo, Hokuriku	.. ..	.. 4,000	1933
Fukushima-Yonezawa, O-U Line	.. ..	.. 3,470	1933
Otsu-Akashi, Tokaido Main Line	.. ..	.. 13,682	1934
Atami-Numazu, Tokaido Main Line	.. ..	.. 2,490	1932
Kokubunji-Hachioji, Chuo Central Line	.. ..	.. 1,317	1930
Hachioji-Kofu, Chuo Central Line	.. ..	.. 3,780	1930
Akabane-Omiya, Tohoku Line	.. ..	.. 5,368	1931
Ochanomizu-Kameido, Sobu Line	.. ..	.. 1,701	1932

The plans include the construction of a new electric line connecting the present Ochanomizu Station of the Yamanote line, which is the inner hoop of the line encircling Tokyo, with the Ryogoku Railway Station, the terminus of the Boso and Hojo lines, and of laying parallel tracks between Ryogoku and Kameido, together with their electrification. The estimate of the cost of construction is over Y. 4,000,000. The distance affected is 2,400 meters and is to be an elevated railway. The plan involves the construction of a new steel bridge of 169 meters over Sumida River and reconstruction of the two bridges of Izumibashi and Kandagawabashi follow with Large Turbo-alternator for Japan.

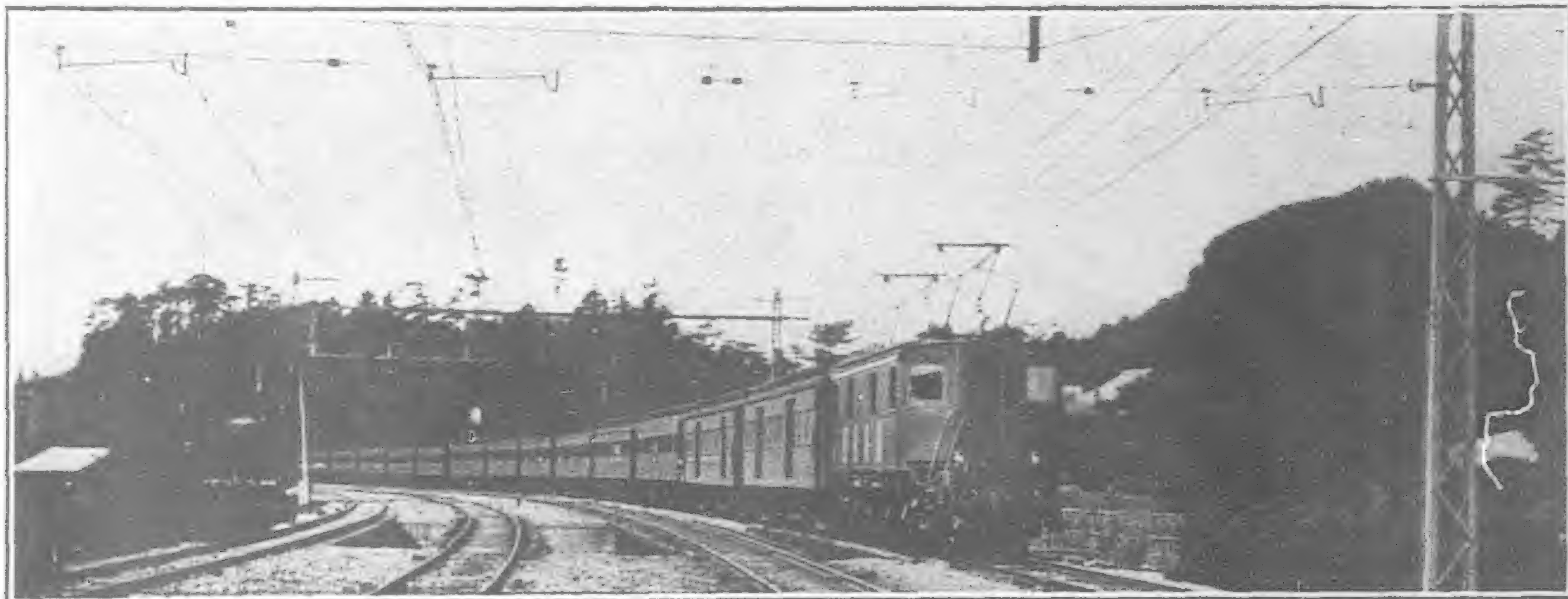


Elevated Railway Approach to Tokyo Central Station

### New Tracks Planned

The railway improvement program calls for the laying of additional tracks starting this year as follows :

1. Between Shinagawa and Tsurumi, at a cost of Y.2,810,000. Work is to be started this year and finished in 1929.

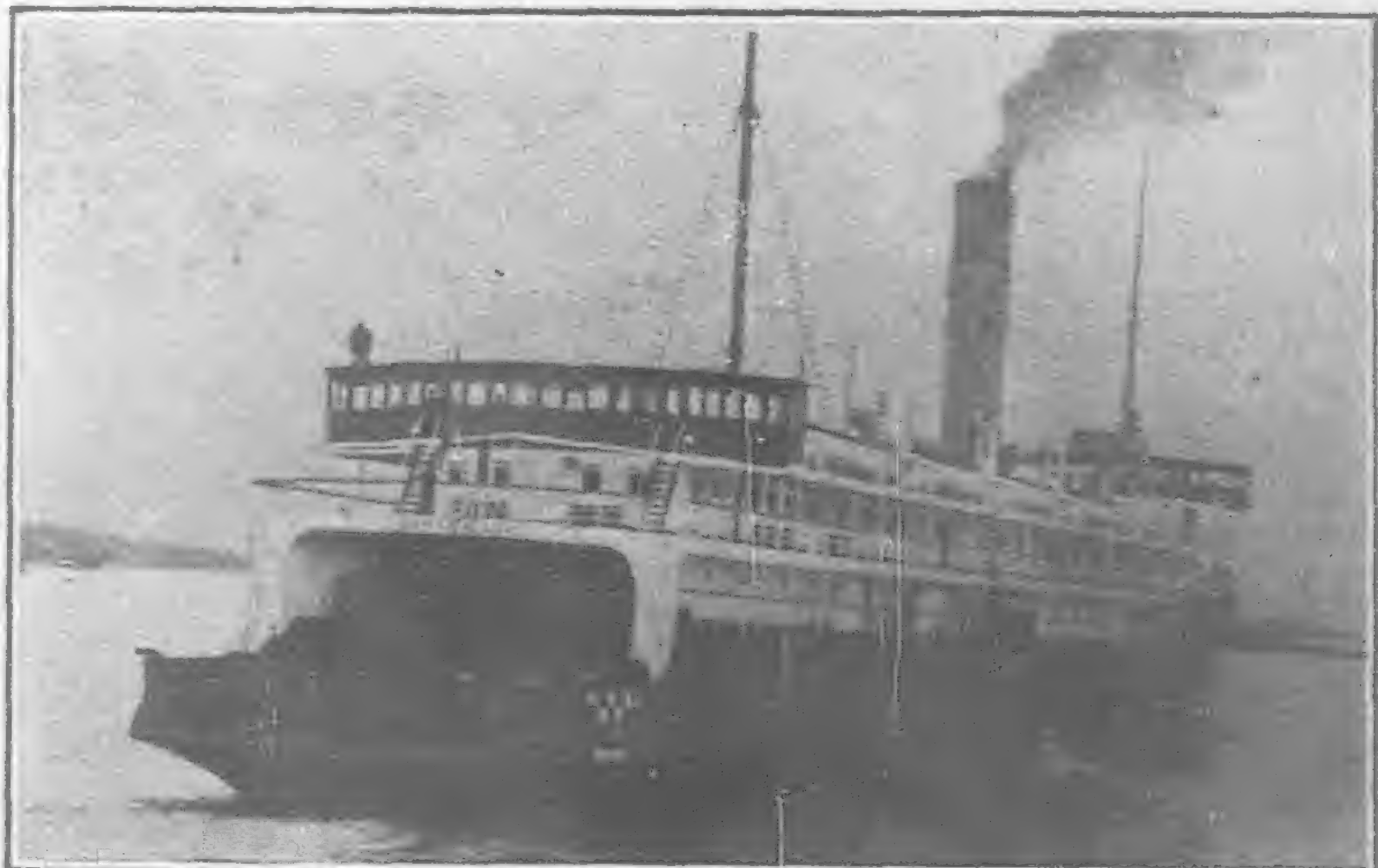
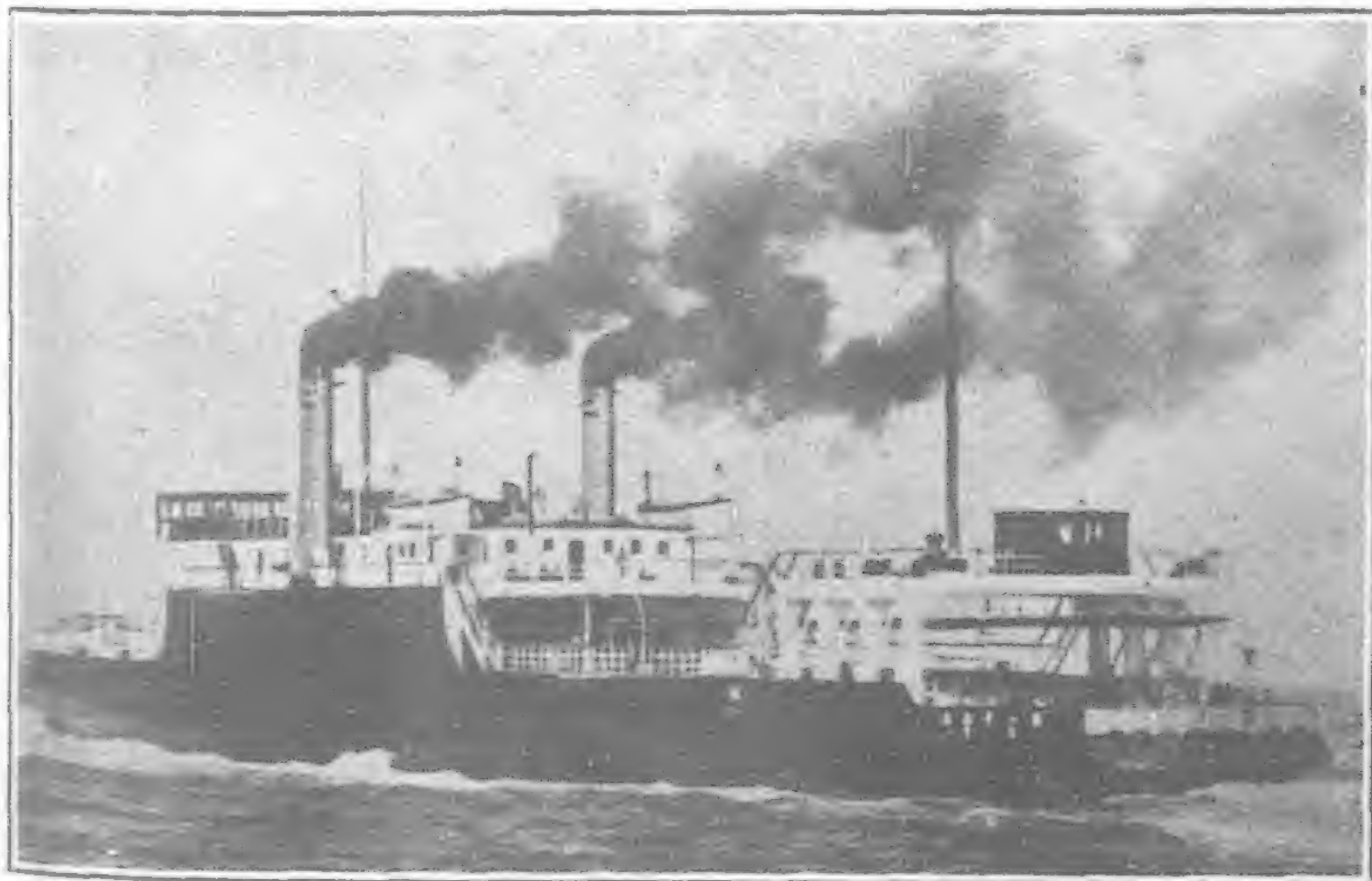


Tokyo-Kobe Express Drawn by Electric Locomotive, near Totsuka

### New Trackwork

One of the most important items of expenditure of the Railway Department is for Open Line Improvement. In the year ending March 31, 1927, the total expenditure on account of this item was Y.83,621,651. The program for the current year for railway improvement calls for the laying of additional track as follows :

2. Between Yokohama and Kozu, at a cost of Y.3,800,000 and finished in 1933.
3. Between Kozu and Numazu, cost Y.9,049,000; work to be finished in 1931.
4. Between Iidamachi and Nakano, cost Y.3,410,000, work to be finished next year.

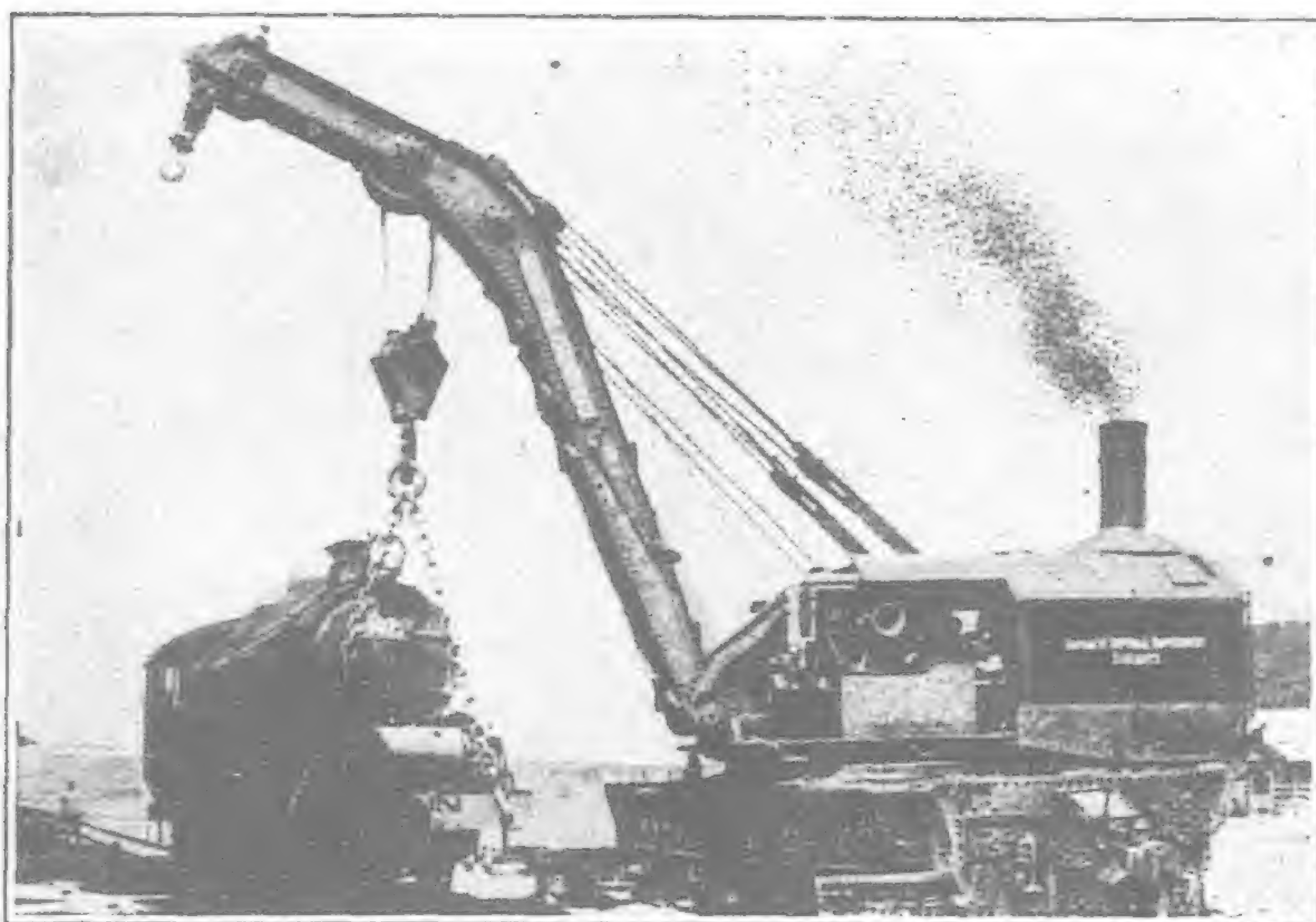


Car Ferries of the Imperial Japanese Railways

Car Ferry Between Aomori and Hakodate

The Heran-Mar





Wrecking Crane for I.J.R. Recently Purchased from America

5. Between Kokubunji and Hachioji, cost Y.2,500,000 and work to be finished in 1933.

6. Between Tokyo and Tabata cost Y.2,546,000; work to be finished next year.

7. Between Tabata and Omiya, cost Y.3,510,000; work to be finished in 1930.

8. Between Kanamachi and Koiwa, cost Y.599,000; work to be finished in one year.

9. Between Tsurumi and Hodogaya, cost Y.2,700,000; work to be finished next year.

10. Between Ryogoku and Ochanomizu; cost Y.7,750,000; work to be finished in 1930.

11. Between Ryogoku and Kameido, cost Y.2,260,000; work to be finished in 1930.

12. Between Ryogoku and Hojyo; cost 499,000; work to be finished in 1929.

#### STATISTICS OF THE GOVERNMENT RAILWAYS OF JAPAN FOR THE YEAR ENDING MARCH 31, 1927

(COMPARED WITH PRECEDING YEAR)

Item	Year 1926—27	1925—26
Area (square miles) .. .. .	† 129,247	† 129,247
Population .. .. .	† 62,044,689	† 60,257,931
Miles of lines worked (road) (m. ch.) .. .. .	8,007.69	7,837.08
Single track sections ( " ) .. .. .	6,783.50	6,658.07
Double " " ( " ) .. .. .	1,158.68	1,126.68
Triple and more " " ( " ) .. .. .	65.31	52.13
Total Miles of main track ( " ) .. .. .	9,358.10	9,115.55
Total Miles of all track ( " ) .. .. .	13,032.63	12,619.60
Average area per mile of line (sq. m.) .. .. .	16.1	16.5
Average mileage of lines per 100,000 of population .. .. .	12.9	13.0
Average mileage of line worked—		
passenger traffic .. .. .	7,846.2	7,627.7
goods traffic .. .. .	7,911.8	7,691.8
Number of Stations .. .. .	2,362	2,292
Capital (yen) .. .. .	2,688,669,616	2,500,154,609
Capital per mile of line (yen) .. .. .	335,910	319,016
Working revenue (yen) .. .. .	484,082,956	480,450,904
Working expenses (yen) .. .. .	270,838,998	259,439,720
Profit (yen) .. .. .	213,243,958	221,011,184
Percentage of expenses to revenue .. .. .	55.9	54.0
Percentage of profit to capital .. .. .	7.9	9.6
Profit .. .. .	213,243,958	221,011,184
Add—Appropriations from the reserve account. .. .. .	—	—
Deduct—Private Rly. control and survey expenses .. .. .	432,659	334,310
—Additional work expenses .. .. .	5,442,502	5,685,453
—Interest charges .. .. .	71,139,015	67,931,932
—Subsidies to local railways. .. .. .	4,962,883	4,152,609
Add or deduct (†)—Balance on the suspense account .. .. .	† 359,619	351,807
Balance (net profit) .. .. .	130,907,279	143,258,687
Working revenue per mile (yen) .. .. .	60,452	62,415
Working expenses per mile (yen) .. .. .	33,822	33,703
Profit per mile (yen) .. .. .	26,630	28,711
Working revenue per train-mile (yen) .. .. .	5.10	5.18

Item	Year 1926—27	1925—26
Working expenses per train-mile (yen) .. .. .	2.85	2.80
Profit per train-mile (yen) .. .. .	2.25	2.38
Locomotives .. .. .	3,965	3,907
Passenger carriages .. .. .	10,058	10,308
Goods wagons .. .. .	61,897	59,607
Aggregate weight of locomotives (ton) .. .. .	285,989	274,716
Aggregate number of seats of carriages .. .. .	558,605	551,451
Aggregate loading capacity of wagons (ton) .. .. .	774,748	744,032
Employees .. .. .	200,500	195,876
Monthly compensation of employees (yen) .. .. .	10,416,094	10,062,833
Number of passengers carried .. .. .	735,706,451	677,085,503
Number of passengers carried one mile .. .. .	11,953,203,057	11,645,130,433
Passenger-miles per mile .. .. .	1,524,700	1,526,690
Passengers per train-mile .. .. .	197.9	206.2
Passengers per vehicle-mile .. .. .	13.6	14.1
Average miles of journey per passenger .. .. .	16.2	17.2
Passenger earnings (yen) .. .. .	288,670,095	225,855,164
Passenger earnings per mile (yen) .. .. .	29,144	29,610
Passenger earnings per pass. per mile (yen) .. .. .	.0191	.0194
Coaching receipts (yen) .. .. .	265,985,340	261,787,479
Coaching receipts per mile (yen) .. .. .	33,900	33,040
Coaching receipts per train-mile (yen) .. .. .	4.40	5.16
Tonnage of goods hauled .. .. .	73,602,765	71,939,246
Tonnage of goods hauled one mile .. .. .	7,265,266,466	7,226,686,969
Ton-miles per mile .. .. .	918,282	939,531
Tons per train-mile .. .. .	210.3	199.3
Tons per vehicle-mile .. .. .	6.2	6.3
Tons per loaded vehicle-mile .. .. .	8.1	8.2
Average miles of goods hauled per ton .. .. .	98.7	100.5
Goods earnings (yen) .. .. .	200,219,009	197,169,594
Goods earnings per mile (yen) .. .. .	25,306	25,633
Goods earnings per ton mile (yen) .. .. .	.0276	.0273
Goods wagon receipts (yen) .. .. .	201,609,955	198,786,210
Goods wagon receipts per mile (yen) .. .. .	25,480	25,843
Goods wagon receipts per train-mile (yen) .. .. .	5.83	6.06
Passenger train mileage .. .. .	* 60,412,852 *	50,696,543
Goods train mileage .. .. .	34,553,521	32,294,876
Mixed train mileage .. .. .	—	9,261,218
Total train mileage .. .. .	94,966,373	92,752,637
Locomotive-mileage .. .. .	108,248,148	107,794,646
Passenger car mileage .. .. .	879,186,686	826,005,408
Goods wagon mileage .. .. .	1,172,649,983	1,155,872,082
No. of vehicles coupled per train—		
passenger car .. .. .	14.6	14.6
goods wagon .. .. .	33.9	31.9
No. of vehicles drawn per locomotive .. .. .	26.70	24.74

N.B.—\* includes the mileage travelled by electric trams and steam motor cars converted at the rate of 10 cars=one train.

† does not cover Taiwan, Chosen and Japanese Karafuto (Saghalien).

#### Private Railways and Tramways

The privately owned electric lines in Japan, designed to give quicker transport, are built on the standard gauge, but their construction is not encouraged where they compete with the Government controlled railways. A proposal by a private company to build an electric line connecting Tokyo with Osaka and reducing the time between these two centers to six hours, has not been sanctioned, although it pops up periodically in some form or other to the intense annoyance of the Railway authorities. Electric tramways and especially motor car services, or passenger and freight are being much extended in all parts of the country. The competition of the motor bus with the Government and private railways has already reached a stage where several of the private lines have been compelled to reduce their passenger and freight rates. So great has been the increase in the use of motor trucks for goods and parcel transport, that the Ministry of Railways found on investigation, that at the end of 1927 the number of motor trucks competing with the Government railway services was 4,210. Of this total, eighty per cent. were Ford trucks. The Ministry estimated that the number of trucks was increasing annually by 20 per cent. Only the narrow roads throughout the country, keeps this increase within bounds. Motor truck competition with the railways is likely to increase and will probably lead to a general reduction of dividends on private railway capitalization.

At the end of March 31, 1927, there were 219 private railways and 156 tramways operating in Japan, having an aggregate mileage of 4,625 and combined capitalization of Y. 2,640,212,320. Besides, there were 90 railways with an open mileage of 205 miles owned by private individuals or companies for their exclusive use.



## Local Railways

The 219 local and private railways have a total of 3,337 miles with a capital invested of Y. 492,086,083. Of these, 146 used steam as a motive power, 66 electric and 22 steam and electricity combined. During the year under review, 49 local railways with a total working mileage of 298 miles were opened to business. Lines under construction but not yet opened to traffic totalled 225 miles with 2,917 miles projected. The number of new charters to private railway companies granted by the government during the year, totalled 64 with an aggregate mileage of 580 miles and an estimated capital amounting to Y. 79,435,782.

These private railways carried 269,921,424 passengers during the year under review, yielding coaching receipts of Y. 42,098,771. The total freight volume moved during the year was 20,715,015 tons, the receipts therefrom totalling Y. 20,687,867.

The average number of locomotives in use by these private lines at the end of the year, was 892 with an aggregate weight of 21,401 tons. This comprises 703 tank locomotives, 69 tenders and 119 electric and 1 gasoline locomotive. The number of passenger carriages belonging to these railways was 2,936 with a seating capacity of 156,039. Goods wagons totalled 10,054 with a loading capacity of 94,141 tons.

## State Purchase of Private Lines

During the last session of the Diet the legislation for acquiring certain private railways was shelved, but in the preceding year five railways were bought including Mito Tetsudo K.K., Echigo Tetsudo K.K., Mutsu Tetsudo, Tomakomai Tetsudo and Hidaka Takushoku Tetsudo. At the coming session of the Diet, 1929, the Government will again propose the purchase of the following private railways at a total cost of some Y. 40,000,000 (to be paid in bonds):

Chugoku Tetsudo	Hokkaido Tetsudo
Shinano Tetsudo	Ikeda Tetsudo
Kamaishi Kozan Tetsudo	Iwate Keiben Tetsudo
Ryobi Tetsudo	Ceibi Tetsudo
Hinokami Tetsudo	Hakata Wan Tetsudo
Annan Tetsudo	Uwajima Tetsudo

## Profit of Private Railways Declining

A recent report says that due to accentuated difficulties prevailing in private railway circles, many companies are now asking for more subsidies or for new grants of subsidies. In order to ascertain the real condition which underlie these movements, the Department of Railways has been investigating as to the average business results of private railways and tramways.

For 1927 there were 223 private railway companies, with a total mileage of 3,495.8 miles. The average daily income on these lines was Y. 61,343 per mile, while expenditure averaged Y. 34,619, leaving a net profit of Y. 26,724 per mile. Compared with 1926, this was a decrease of 48.3 sen or about 1 per cent. in profit. Average returns for 1928 are expected to be worse, in view of increased activities on the part of motor cars all over Japan. The authorities are now considering measures to improve the situation.

## 34 New Railway Licensed

The Railway Office granted permits in January for the construction of 34 new lines during the next fiscal year. This is considered as confirmation of Railway Minister Ogawa's declared positive policy, establishing a new record for wholesale permits.

The proposed 34 lines cover practically all parts of the Empire.

Following are the proposed connections:

## Northern District

Hanamaki-Kamaishi in Iwate Prefecture; Macenogo-Yajima in Akita Prefecture; Shirayama-Niigata, in Niigata Prefecture; Kuji-Fushiro, in Iwate Prefecture; Ishinomaki-Megawa, in Miyagi

Prefecture; Tateoka-Samugae, in Yamagata Prefecture; Hidarizawa-Arado, in Yamagata Prefecture; Nayori-Amaryu, in Hokkaido; Nakawakibetsu-Nakasaro, in Hokkaido; Abashiri-Uharanai, in Hokkaido; Kikouchi-Fukuyama, in Hokkaido; Kawamata-Tsushima, in Fukushima Prefecture; Nishi-Yonezawa-Yatani, in Yamagata Prefecture; and Ichinohe-Araya, in Iwate Prefecture.

## Middle District

Uwajima-Chikanaga, in Ehime Prefecture; Nagakura-Taishi, in Ibaragi Prefecture; Hanoura-Mugi, in Tokushima Prefecture; Ohama-Okunada, in Fukui Prefecture; Sonobe-Sasayama, in Kyoto Prefecture; Yatsushika-Sekimiya, in Hyogo Prefecture; Hinohara-Muikaichi, in Yamaguchi Prefecture; Ogaki-Tarumi, in Gifu Prefecture; Kogori-Hagi, in Yamaguchi Prefecture; Atami-Shimoda, in Shizuoka Prefecture; Fukuyama-Shiomachi, in Hiroshima Prefecture; Hiroshima-Hongo, in Hiroshima Prefecture; Tonoda-Okunada, in Kyoto Prefecture; Katsuyama-Minamiya, in Tottori Prefecture; and Iwaiota-Takahara, in Tottori Prefecture.

## Southern District

Shibushi-Takasu, in Kagoshima Prefecture; Kinoshiki-Saganoseki, in Oita Prefecture; Mori-Miyahara, in Kumamoto Prefecture; Kobayashi-Miyazaki, in Miyazaki Prefecture; and Nobeoka-Hinokage, in Oita Prefecture.

## New Railways Licensed

The following three railways were licensed on December 27, 1928:

*Takao Denki Tetsudo K.K.*—(Takao Electric Railway Co., Ltd.) Route: From Nishi Kyomaru Machi, Shimo Kyo Ku, Kyoto to Umegahata Mura, Kuzuno Gun, Kyoto Prefecture, total 4 miles 40 chains. Cost of Construction: Estimated at Y. 1,500,000.

*Chichibu Tetsudo K.K.*—(Chichibu Railway Co., Ltd.) Route: From Chichibu Machi, Chichibu Gun, Saitama Prefecture to Yokose Mura, same Gun. Total 3 miles 40 chains. Cost of Construction: Estimated at Yen 553,000. This railway is to be operated by electric power, and is to be devoted to freight service.

*Maruoka Tetsudo K.K.*—(Maruoka Railway Co., Ltd.) Route: Higashi Jugo Mura, Sakai Gun, Fukui Prefecture to Oishi Mura. Total distance, 1 mile 35 chains. Extension line. Cost estimated at Y. 168,000.

## Tramways

At the end of the year under review, there were 156 tramways with 1,668 miles in operation and capitalized at Y. 1,900,845,573. Classified they were made up as follows:

Power	No. of Tramways			Mileage	Capital
Electric . . . . .	88	1,142	1,768,472,010		
Steam . . . . .	29	254	9,282,360		
Gas Motor . . . . .	14	87	13,927,500		
Horse . . . . .	22	139	108,174,000		
Human Power . . . . .	15	42	989,703		
Total	156	1,668	1,900,845,573		

During the year, 33 new tramways with 97 miles were opened to business while 25 tramways with a mileage of 96 miles were granted charters. Most of these are electric lines for suburban and interurban traffic. On the other hand, 19 charters for private tramways were invalidated during the year. Tramways under construction at the end of the year totalled 106 with an aggregate of 663 miles to be constructed. These include 68 electric tramways, 460 miles, 10 steam lines, 63 miles 7 gas motor lines, 10 horse power and 6 human power lines.

At the end of March, 1927, there were altogether 245 electric locomotives and 6,563 cars with 388,308 seats and 2,285 wagons with an aggregate loading capacity of 7,942 tons, operated on the private tramways of Japan.





General View of the Platforms of the New Umeda Freight Station at Osaka

# Japanese Government Railways in the Kyoto-Osaka District

## New Passenger and Freight Depots and Port Terminals at Osaka

By Eisaburo Kusano

**I**N May of this year, the Government Railway of Japan begins to build a Y.100,000,000 station in Osaka. The work starts with the construction of three elevated platforms on the spacious sideline yard extending between the present station building and the freight station of Osaka which has only recently been erected within the premises of the Osaka Station. The completion in 1933 of this new Osaka Station will mark the end of an extensive program of general improvement of the Government Railway in and around Osaka which has been going on for the past several years. The improvement program includes the construction of new freight lines, freight train switch yards, etc.

In fact, the construction of three freight lines was started some years ago in and around Osaka with the object of strengthening the freight service which was and is still over-crowded; of these, the Osaka freight line and the Osaka harbor line have been completed, the latter opening to business on December 1, last year. The remaining Joto (Castle-Eastern) freight line has also neared completion, and it is expected that the operation of this line will commence shortly.\* With the accomplishment of these three freight lines, the Osaka Station authorities take the first step of realizing their long cherished dream of handling the passenger and freight separately and efficiently. But, prior to dealing with these freight lines and proposed new Osaka Station more in detail, the outlook of the situation in relation to the importance of the work which has already been done will be briefly outlined.

### Remarkable Increase in Volume of Traffic

Primarily, Osaka and its vicinity constitute one of the most prosperous industrial centers of Japan and the means of carrying traffic in this locality has made a remarkable development in recent years, stimulated by the enormous expansion of the volume of traffic. In the course of the past 10 years, the number of passengers as well as the quantity of freight handled at every point of the Government Railways in this district witnessed an increase by nearly three times. Investigations made by the Osaka Municipality, regarding the amount of work done at the Osaka harbor and many of its canals in the city show a similar result. Furthermore, when one takes into consideration the incessant improvement of the old roads and opening of up-to-date new highways in and around the city of Osaka, as well as the remarkable development of the

interurban electric railways running in all directions from this city, it is evident that the actual increase of the volume of traffic in this locality in recent years is far greater than that shown by the foregoing percentage.

The Government Railway operation in the Kyoto-Osaka-Kobe district until about 10 years ago was such, however, that all the branches of work of the railway management had to be done at the Osaka Station, of which the accommodation had already been found rather limited.

As a matter of fact, it was not without difficulty that the Osaka Station in those days managed to run the freight and passenger trains on Fukuchiyama line starting and terminating their journey at this city. The capacity of the station was taxed to such an extent that confusion resulted, eventually causing a great deal of inconvenience directly or indirectly to the public. With the situation becoming aggravated month after month, it became absolutely necessary to do something to mitigate the situation, especially as it had become evident that some trouble concerning freight transportation would be brought about on the Kansai line.

A fundamental improvement of the Government Railway system in the Kyoto-Osaka-Kobe district thus became indispensable, but it was too late when the necessity was fully realized; that is, if the desired fundamental improvement was to be started all at one time, it was evident that progress on the work would not catch up with the speedy increase of the volume of traffic, and furthermore, it would cost an enormous amount of money. Therefore, as an emergency measure, to reduce the amount of work done at the Osaka Station in a great rush and confusion, a freight train switch yard, where freight cars are sorted out and reorganized into different trains in accordance with their respective destinations, was created at Umekoji near the Kyoto station, although it was generally admitted that the site was rather out of place. Simultaneously, a double track was built in the north of Osaka as an exclusive side track for freight trains which need not stop at the Osaka Station. These emergency improvements proved more effective than had been expected, and thus the Railway authorities managed to tide over the crisis of over-congestion in Osaka temporarily. With this emergency work done, the time was ripe for effecting a fundamental improvement of the Government Railways system in the Kyoto-Osaka-Kobe district.

\*This article was written at the end of January, 1929.



## Present Osaka Station Too Small

The transportation capacity is always an important factor in measuring the efficiency of any railway. Now, here is the Government Railway in the Kyoto-Osaka district, where neither the trunk line nor the branch lines carry passengers and freight with ease. The largest part of the main line between Kyoto and Osaka is double tracked, instead of being quadruple tracked, but in view of the fact that the line is equipped with modern automatic signals, it is considered that the railway authorities could operate trains more frequently on this line, but for the inability of the Kyoto and the Osaka stations to accommodate more trains.

Not only this part of the Tokaido line, but there are many districts on other lines in this country where the Railway authorities face a similar difficulty, that is, the volume of traffic in these particular localities have developed to the limit of the transportation capacity of the existing lines, simply on account of the lack of accommodation facilities at local centers.

What the Railway authorities were concerned about most was, however, that the volume of traffic on the



Illustrated in this map is the present situation of the Government Railway system in the Kyoto-Osaka district which constitute one of the most prosperous industrial centers of the Island Empire. One of the salient features of the present improvement plan is the division of the passenger and freight service at the Osaka station; the freight station is already built, and the construction of the passenger station begins in May, this year. In accordance with the foregoing principle of the division of work, all the freight trains on the Kansai line, Katamachi line, Harbor line, and the Joto line, which are operated in the southern section of the industrial city, are going to reach the Osaka freight station by making a detour to the Suita freight switch yard upon completion of the Joto freight line in the immediate future. An elevated approach to the new Osaka (passenger) Station is now under construction, as shown in broken lines in the map.



From "The Japan To-day and To-morrow"

### General View of Osaka Station

- 1.—Osaka Station which will be torn down when a new and more elaborate one, now under construction, is completed. The site on which the station stands to-day will be included in a large public square to grace the approach to the new station.
- 2.—Platform of the new freight station.
- 3.—New building of the Osaka District Railway Office.
- 4.—Elevated track of Osaka-Kobe interurban electric railway.
- 5.—Railway yards of present Osaka Station.

Tokaido main line, (which connects Tokyo and Kobe via Nagoya, Kyoto, and Osaka, and continues on to the Sanyo main line which extends from Kobe to Shimonoseki, which is the southern end of the Main Island), may soon reach such a stage where they would be unable to increase the frequency of the train operation. Experience has taught them that the extension of stations, especially terminals has a more significant bearing upon the increase of the transportation capacity of a line than the construction of a new parallel line. Hence the extension of the Osaka Station has become indispensable, not only to mitigate the traffic congestion in this part of Japan, but also, in order to increase the transportation capacity of the Tokaido main line.

### Requirements of New Osaka Station

Generally speaking, the Government Railway of Japan attach not so much importance to the appearance of the station building in connection with the station improvement work, as they care about the practical promotion of efficiency of a station.

The requirements of the new Osaka Station, consequently,





New Umeda Freight Station at Osaka

were also contemplated from the foregoing practical business point of view, and they were roughly mapped out as follows :

1. Increase of platforms and side-lines ; the extension of the hall-way and waiting rooms of the main station building, and improvement of the accommodation of the luggage office.

2. The extension of the passenger train switch yard.

3. The extension of the home for freight trains starting and terminating their journeys at this station, and also, improvement of the highways and extension of canal-basin connected with the freight service of this station.

4. The extension of the freight train switch yard.

In view of the fact that the Osaka Station is a local center for passenger and freight service on the Government Railway in this district, it would be ideal if the foregoing four items of the requirements of the new station could be realized within the present premises. In order to do so, however, it requires an enormous site ; so much so, that it is impossible.

Nevertheless, if the requirements Nos. 1 and 3, namely, the improvement of the passenger and freight service, be carried out somewhere out-side the present station, that would be meaningless, and therefore, they have to be realized within the present site at any cost. As for the items Nos. 2 and 4, however, they need not necessarily be realized within the present premises, and therefore, it was decided that a freight and passenger train switch yards be built elsewhere in the neighborhood of the present station.

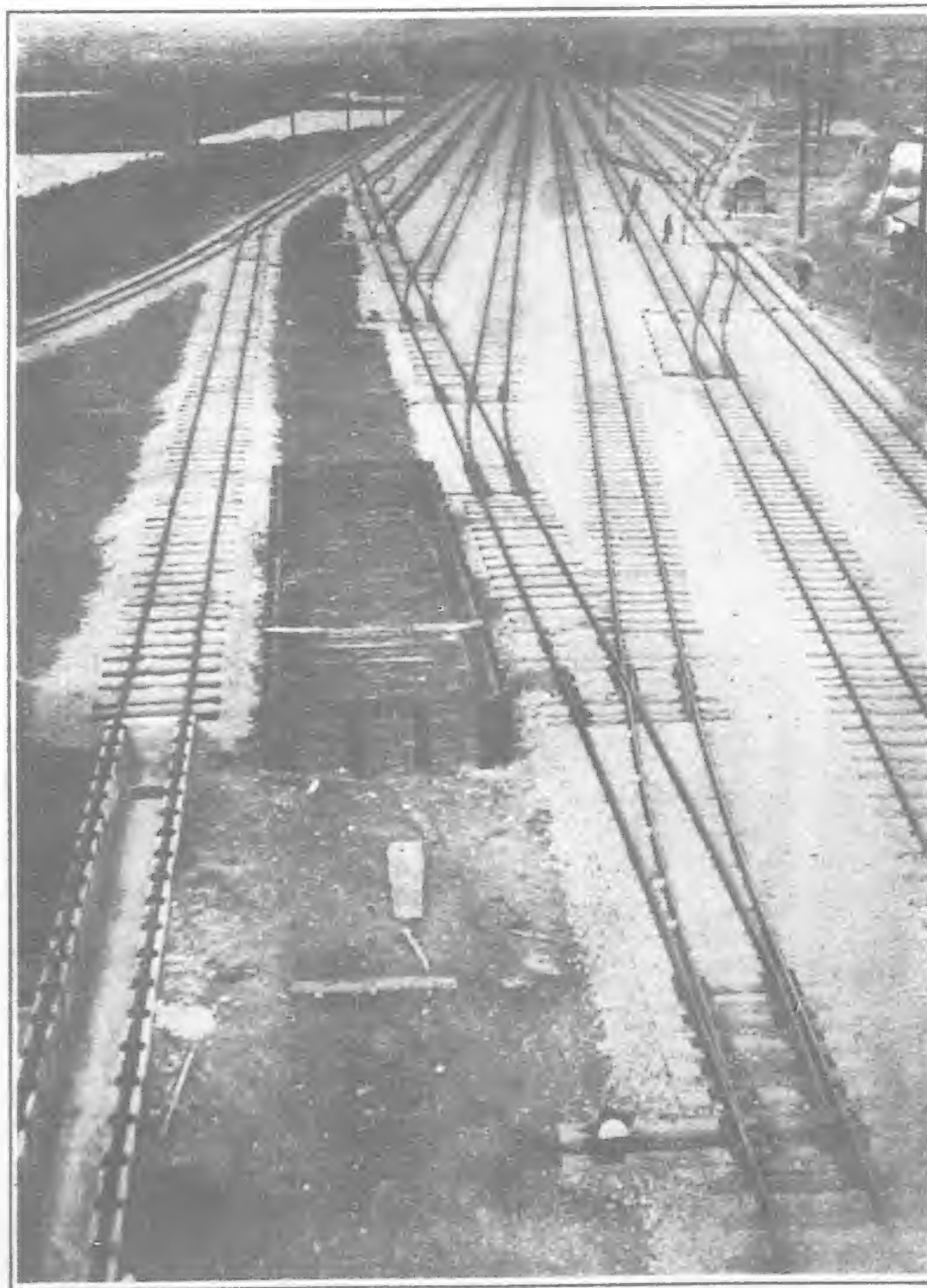
### Passenger and Freight Train Switch Yards

The Railway authorities have thus selected the site for the freight train switch yard at Suita, which is located on the Tokaido main line between Kyoto and Osaka, nearer the latter. The price

of land was quoted rather low, and there was hardly any geographical obstacles for the purpose. Furthermore, the place was located at such a convenient point that it could be easily linked up with various branch lines such as the Joto, Kansai, and Katamachi lines.

Nearly 200 acres of the land was purchased there, and the work was commenced with the object of building such a switch yard where 4,000 freight cars may be handled a day. The work was divided into a number of stages, and the first phase of the course was completed in 1923. So far, about 2,000 freight cars are being handled a day at the Suita freight switch yard. The construction work is still going on and the yard will be handling 3,000 freight cars a day before long. When this stage is reached, some of the work now being done at the Umekoji-freight switch yard near Kyoto will be transferred to Suita, and the Umekoji will be used for the work relating to the proposed construction of another double track between Kyoto and Maibara in line with the present double track.

As for the passenger train switch yard of the Osaka station, the site has not yet been selected, although it is proposed that the yard should have a capacity of composing 50 trains a day. At present,



Track Layout in the Kizu District on the Osaka Harbor Line



the Osaka Station has an equipment for organizing passenger trains for its Fukuchiyama branch line, and so far as the Tokaido main line is concerned, it is a mere way-side station.

### Osaka Cannot Remain A Wayside Station

Osaka cannot remain a wayside station. This fact is already proved by the movement of passenger and freight. For instance, up to 80 per cent., of the passengers on the trains passing this station either start their journey here or end here; it is only the remainder of the 20 per cent. who pass on to their respective destinations. Fortunately, almost an equal number of passengers who disembark at the Osaka Station get into the train, but this cannot always be the case; one of the most illustrious examples is the express trains passing the Osaka Station in the morning and in the evening. Theoretically, and also, from the standpoint of practice, more than one half of the trains passing the Osaka Station at present should end their journey at this station; otherwise, the Railway authorities cannot avoid operating trains inefficiently. Nevertheless, this can only be done when the number of platforms are increased, and when a spacious passenger train switch yard is completed. The present program of extending the Osaka Station is significant from different standpoints but one cannot overlook the fact that to make the Osaka Station a terminal in name and reality is one of the fundamental requirements. With this in view, the proposed extension—or rather, re-construction—of the passenger train switch yard is of great importance.

### Osaka Freight Station

Until November, (1928), the passenger and the freight service of the Osaka Station was not divided. Following the principle that it is always more efficient and profitable to divide the passenger and freight service at large stations, the program for the new Osaka Station provides the division of the two different services. And, as a matter of fact, a new freight station was constructed in the back ground of the present Osaka station where there was a comparatively small number of dwelling houses standing, and a new railway reaching this freight station was built from the upper stream of the Yodo-gawa which flows through and outside the city, as shown in the accompanying map.

For convenience in pursuit of the general improvement plan, the construction of the freight station was started prior to the commencement of the reconstruction of the Osaka passenger station.

The new freight station of Osaka, named the Umeda Station, (formerly, the Osaka Station itself was called by this name), has a capacity of handling approximately 3,000,000 tons of freight a year. Prior to the construction of this freight station, the Osaka station handled about 1,800,000 tons of freight, even with the restrictions that no freight of extreme weight should be brought into this station. When this restriction is lifted, it was expected, the annual amount of freight service would have easily exceeded the 2,000,000 tons mark.

The peculiar nature of this freight station required that it should be built on the ground level, although the passenger station could be an elevated one, by means of building an elevated approach to the passenger station on the Tokaido line and also on the Joto line. Now that the Osaka freight line, that short by-pass in the north of the present Osaka Station, is completed, most of the freight trains handled at this new freight station are sent to the Suita freight switch yard, and they are readjusted and reorganized there.

This new freight station, which was opened to business on December 1, 1928, was built at the cost of ¥35,000,000. Its site consists of about 55 acres, and the side-lines within its compound total 12 miles. The freight home is going to have six steel sheds of which the length vary from 600 to 900 feet; so far, four of them have been built. Furthermore, the freight station has an adjoining canal basin extending to nearly four acres, and it is connected with the Osaka harbor by canals. There are six illuminating lights in the freight yard, each one of which has a power of 1,600 watts.

### New Passenger Station of Osaka

Details of the new passenger station of Osaka are not yet available. Generally speaking, however, the entire structure is going to be either reinforced concrete or reinforced slab. It is going to have six platforms, that is, twelve places where trains

arrive and leave. It is expected that these platforms will have a capacity of accommodating 30 trains per hour at a pinch.

The main building of the new passenger station will stand on the present premises, but as the western and eastern ends of the front will be withdrawn towards the north, the new station will have a considerably larger square in front of it as compared with the present one. The situation, however, is exceedingly complicated as the new station plan overlap each other with various other construction plans of inter-urban electric railways, underground railway plans, the city construction plan, etc., and to make the matter worse, all of these building work is to be started at the same time.

At the eastern end of the new passenger station site, the Osaka-Kobe Express Electric Railway Company, familiarly known as "Hankyu" is already building an enormous Hankyu building. The Rapid Transit System of the Osaka Municipality, that is, the underground railway, will shortly begin its building work starting with the construction of an underground main station in the neighborhood, now that the city expects to get the approval of the Home and Finance Offices for the issuance of ¥80,000,000 loans very soon. Furthermore, the Keihan, or the Kyoto-Osaka Electric Railway Company is also going to build its Osaka terminal in this locality; it is understood that as soon as the Joto line is connected with the new passenger station with an elevated approach, the existing double track between Sakuranomiya and Osaka is to be sold to this company. As for the western side of the station, nearly 2.5 acres of land belonging to the Government Railway is to be offered at the disposal of the General Post Office of Osaka, while the Hanshin, or the Osaka-Kobe Electric Railway (the one running nearer the sea coast) is about to put up its Osaka terminal somewhere near here. On the top of them all, several new highways are to be centered about the new passenger station of Osaka, in accordance with its city construction plan; one of these highways is to run through the new station from south to north beneath the elevated station building.

At present, there are the luggage and other offices of the Osaka Station, the bicycle storage house, cheap restaurants, etc., are crowded in and around the station between the Hankyu and Hanshin terminals, and the traffic is exceedingly crowded, and the sight in front of the main entrance to this industrial metropolis of Japan can be described as anything but pleasant. When the new station is completed, however, these are to be cleared out of sight, as they are to remove into office and shop departments underneath the elevated station.

By the time all of the construction work is accomplished, the city of Osaka will have a splendid main entrance; the square in front of the Osaka station will be hemmed in by various buildings of the terminal of inter-urban electric railways, so much so that there will be an exhibition, so to speak, of terminal buildings.

The reconstruction of the passenger station of Osaka has not been started yet, but the elevated approach to this new station has been under construction for some time past at various points. As is shown in the map, the Tokaido trunk line twice crosses the Yodo-gawa, which flows encircling the city, coming from Kyoto to Osaka, and going out of Osaka to Kobe. And, the distance between the Osaka station and the upper and lower stream of the Yodo-gawa on the Tokaido line is going to be elevated, and so is the Joto line's approach from Sakuranomiya.

### Joto Freight Line

The present Joto line is going to be partly elevated and connected with the new passenger station of Osaka, and therefore, it would be ridiculous to run freight trains on this line. Furthermore, already about 100 trains are being daily run on this line, and if the operation of the passenger and freight trains are to be maintained, it would soon become necessary to build another double track in parallel with this line in order to mitigate the traffic congestion. This is a difficult proposal, especially in view of the fact that this line runs through the city section of Osaka where the industrial and commercial development is remarkable. In consideration of the foregoing various difficulties, it has been decided that a new freight line should be constructed in such a manner as the Joto line will be directly connected with the Suita freight train switch yard. This construction work is nearing completion, and it would be before long that all the freight trains on not only the Joto line but

(Continued on page 132).

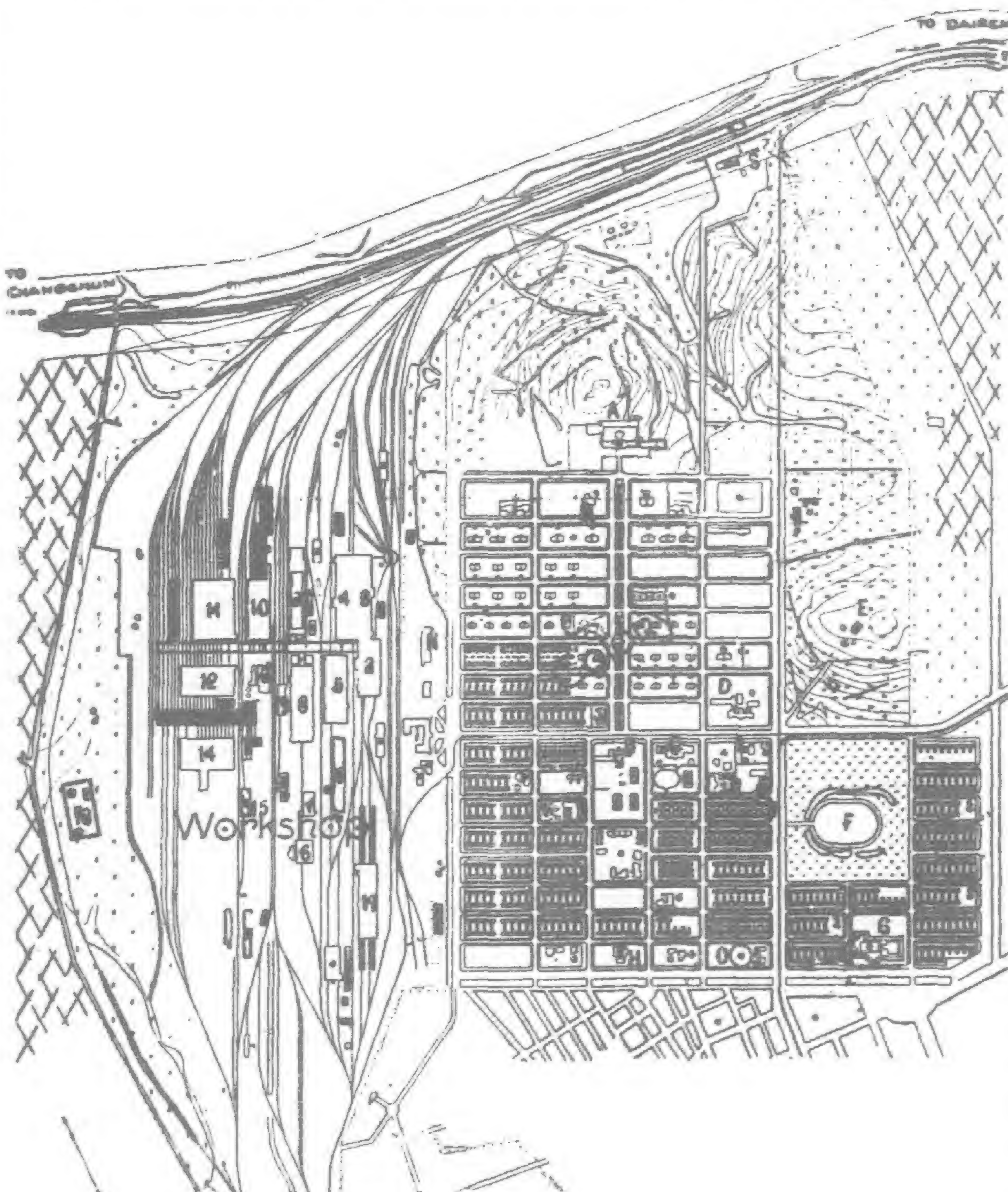




General View of the Shakako Works of the South Manchuria Railway Company at Dairen

## S.M.R. Shakako Shops

THE largest and best equipped railway workshop in the Far East is operated by the S.M.R. at Shakako, a suburb of Dairen. Originally, a small central railway shop had been erected in Dairen to meet the requirements of the railway and to do outside work. Other smaller shops were located at Liaoyang, Kungchuling and Antung. When the S.M.R. took over active direction of the line, one of its first steps was to lay out a modern workshop at Shakako (about 4 miles from Dairen) completing its erection in 1911 at a cost of Y.4,500,000. Its original capacity was to execute repairs simultaneously on 25 locomotives, 36 passenger cars and 130 freight cars of 30 tons each and at the same time construct and repair other railway and mining machinery. Most of the original equipment for the building and shops was purchased in England, with the exception of ten steel structures for the locomotive and machine shop supplied by the Morgan Engineering Company of Ohio, U.S.A. A complete description of the original plant giving the details of the mechanical equipment of the shops and the names of the makers was published in the August 1914 number of the "Far Eastern Review." The supply



Plan of Shakako Works

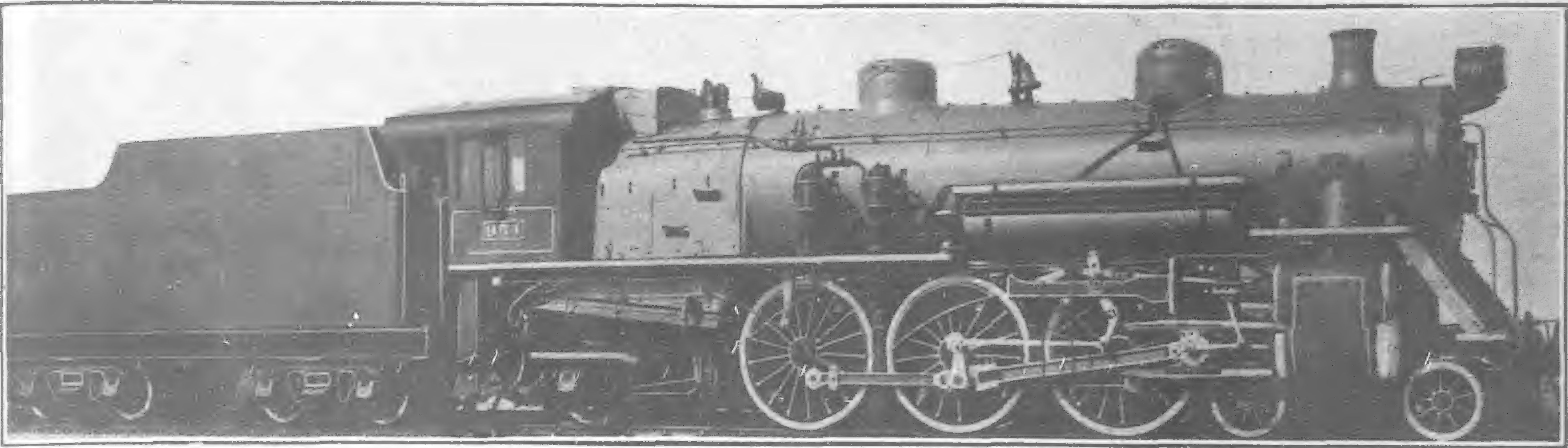
- |                                   |                          |                               |
|-----------------------------------|--------------------------|-------------------------------|
| 1 General Office.                 | 12 Passenger Car Shop.   | E Shrine.                     |
| 2 Boiler Shop.                    | 13 Power Station.        | F Recreation Ground.          |
| 3 Erecting Shop.                  | 14 Paint Shop.           | G Sewage.                     |
| 4 Machine Shop.                   | 15 Veneering Shop.       | H Temple.                     |
| 5 Smithy.                         | 16 Steel Foundry.        | J Co-operative store.         |
| 6 Tool & Electric Repairing Shop. | 17 Girder Shop.          | K Kindergarten.               |
| 7 Brass Foundry.                  | 18 Pumping Station.      | L Church.                     |
| 8 Foundry.                        | 19 Pattern Shop.         | M Superintendent's Residence. |
| 9 General Store.                  | A Primary school.        | N Testing Laboratory.         |
| 10 Truck Shop.                    | B Club-House.            | O Gas Holder.                 |
| 11 Saw Mill & Freight Car Shop.   | C Lodging for Bachelors. | P Public Bath.                |
|                                   | D Hospital.              | S Shakako-Station.            |

of machine tools was about equally divided between British and American manufacturers. Although many new machines have since been added, amongst which one notices many of Japanese make, the equipment still needs bringing up-to-date.

The main plant remains more or less the same as when it was laid out in 1912. The works to-day cover a total area of 490 acres, of which 225 acres is occupied by the workshops and yards and the balance by residential quarters for the staff and workmen. The workshop buildings alone cover 16.5 acres. There is a total personnel attached to the works of about 3,000. Contrary to the general belief in China, the majority of the skilled workmen are Chinese whose efficiency is rated as high as their Japanese co-workers. At present there are 1,174 Chinese and 1,102 Japanese skilled mechanics employed at the Shakako Works, with unskilled labor divided about equally between Chinese and Japanese, 285 of the former and 260 of the latter. Altogether the works employ a total of about 3,000.

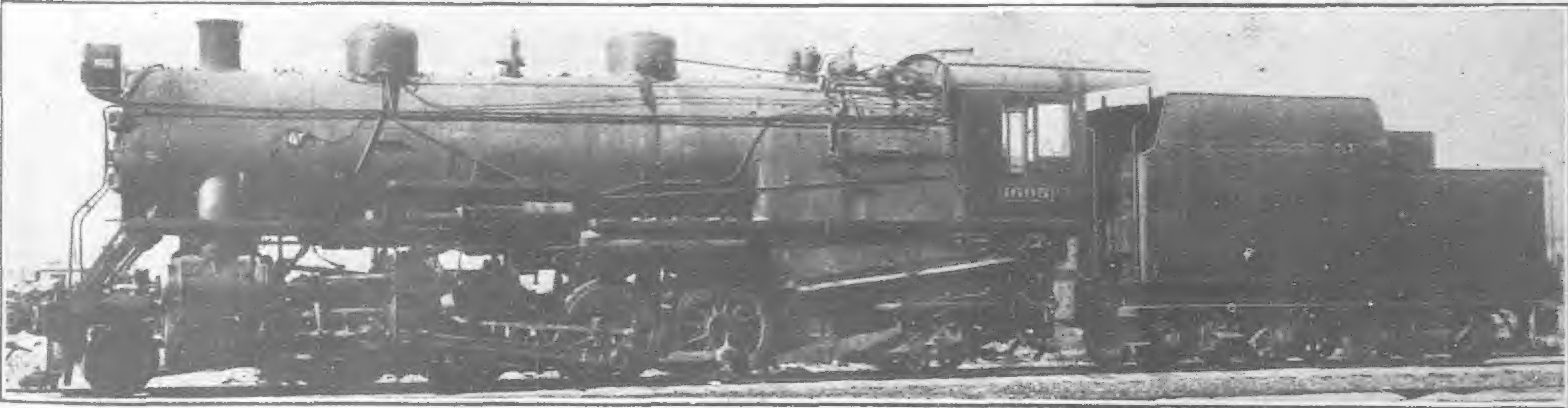
The present annual capacity of the works enables them to build 40 new locomotives, 55 new passenger coaches and 650 new freight cars. Practically every part of the cars and





Pacific Type Superheated Locomotive (4-6-2) Built for the S.M.R. at the Shakako Works

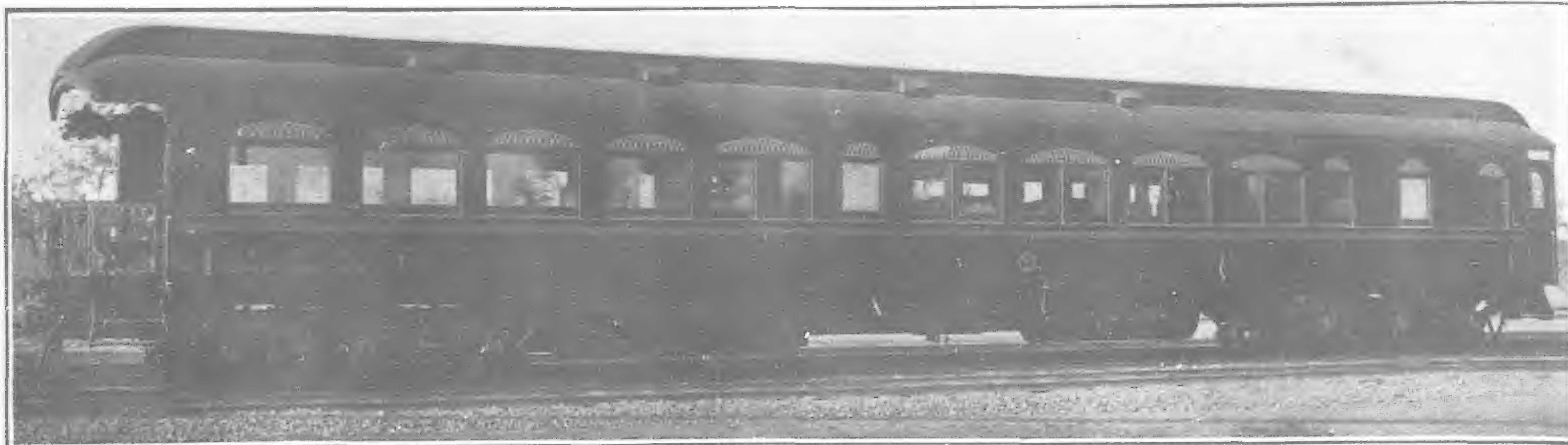
Gauge of Track, 1435 m.m.				JOURNALS.				dia. × length
LOADED WEIGHTS.				Driving .. .. .	..	..	..	267 × 320 m.m.
On driving wheels	..	..	..	Engine truck	..	..	..	140 × 320 "
On leading truck	..	..	..	Engine trailer	..	..	..	203 × 375 "
On trailer	..	..	..	Tender truck	..	..	..	127 × 228 "
Total engine	..	..	..	BOILER.				
Tender	..	..	..	Type .. .. .	..	..	..	Straight top.
Engine and tender	..	..	..	Working pressure per sq. cm.	..	..	..	14.06 k.g.
				Outside diameter of first ring	..	..	..	1,785 m.m.
WHEEL BASE.				Fire box, length and width	..	..	..	2,587 × 1,860 "
Driving .. .. .	..	..	..	Tubes, number and outside diameter	..	..	..	145 pcs. 51 "
Total of engine	..	..	..	Flues, number and outside diameter	..	..	..	32 pcs. 136.5 "
Total of engine and tender	..	..	..	Length between tube sheets	..	..	..	5,521 "
				Heating surface, tubes and flues	..	..	..	127.77 M <sup>2</sup>
CYLINDERS.				Heating surface firebox	..	..	..	22.30 "
Diameter .. .. .	..	..	..	Heating surface, total	..	..	..	150.07 "
Stroke of piston	..	..	..	Superheater heating surface	..	..	..	75.78 "
Valve, kind .. ..	..	..	..	Equivalent heating surface	..	150.97 + (1.5 × 75.78) =	263.74	"
				Grate area .. .. .	..	..	..	4.81 "
WHEELS.				TENDER.				
Diameter of driving	..	..	..	Tank .. .. .	..	..	..	Water bottom.
Diameter of engine truck	..	..	..	Frame .. .. .	..	..	..	Channels.
Diameter of engine trailer	..	..	..	Water capacity	..	..	..	35,000 L.
Diameter of tender truck	..	..	..	Coal capacity .. ..	..	..	..	13.4 k.g.
				Maximum tractive power	..	..	..	15.7 "



Mikado Type Superheated Locomotive (2-8-2) Built for the S.M.R. at the Shakako Works

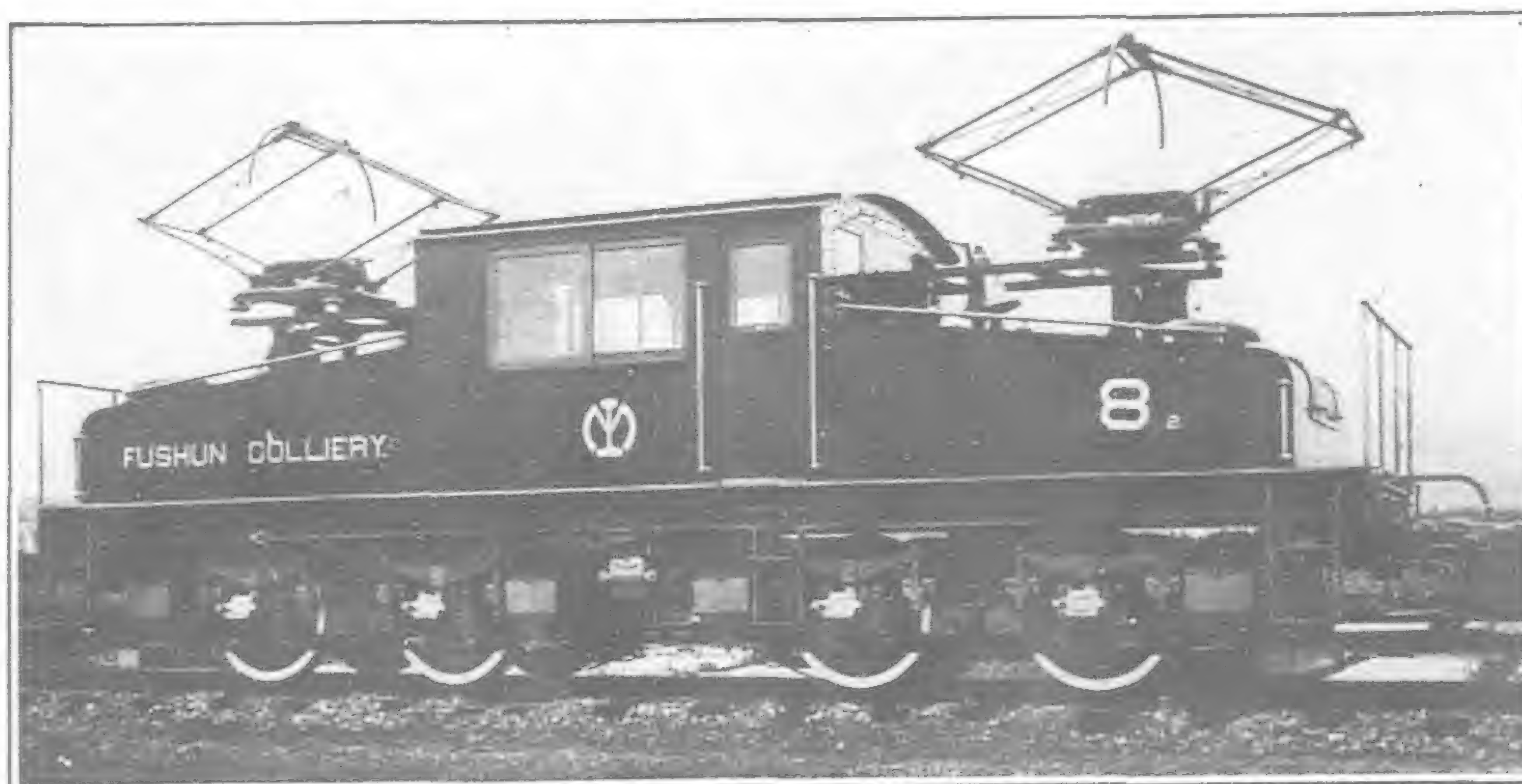
Gauge of Track, 1435 m.m.				JOURNALS.				dia. × length
LOADED WEIGHTS.				Driving .. .. .	..	..	..	254 × 305 m.m.
On driving wheels	..	..	..	Engine truck	..	..	..	165 × 305 "
On leading truck	..	..	..	Engine trailer	..	..	..	203 × 356 "
On trailer	..	..	..	Tender truck	..	..	..	127 × 229 "
Total engine	..	..	..	BOILER.				
Tender	..	..	..	Type .. .. .	..	..	..	Straight top.
Engine and tender	..	..	..	Working pressure per sq. cm.	..	..	..	12.7 k.g.
				Outside diameter of first ring	..	..	..	2,065.4 m.m.
WHEEL BASE.				Fire box, length and width	..	..	..	2,921 × 2,140 "
Driving .. .. .	..	..	..	Tubes, number and outside diameter	..	..	..	245 pcs. 51 "
Total of engine	..	..	..	Flues, number and outside diameter	..	..	..	42 pcs. 137 "
Total of engine and tender	..	..	..	Length between tube sheets	..	..	..	5,638.7 "
				Heating surface, tubes and flues	..	..	..	323.11 M <sup>2</sup>
CYLINDERS.				Heating surface firebox	..	..	..	20.16 "
Diameter .. .. .	..	..	..	Heating surface, total	..	..	..	343.27 "
Stroke of piston	..	..	..	Superheater heating surface	..	..	..	87.79 "
Valve, kind .. ..	..	..	..	Equivalent heating surface	..	343.27 + (1.5 × 87.79) =	474.96	"
				Grate area .. .. .	..	..	..	6.25 "
WHEELS.				TENDER.				
Diameter of driving	..	..	..	Tank .. .. .	..	..	..	Water bottom.
Diameter of engine truck	..	..	..	Frame .. .. .	..	..	..	Channels.
Diameter of engine trailer	..	..	..	Water capacity	..	..	..	22,700 L.
Diameter of tender truck	..	..	..	Coal capacity .. ..	..	..	..	13 k.g.
				Maximum tractive power	..	..	..	25.40 k.g.





All Steel First Class Pullman Observation Car Built at the Shakako Works

locomotives are made at the works with the exception of the larger steel pieces for locomotives. The locomotives for the S.M.R. system follow the American practice, and the steel frames as well as the main axles and driving wheels are supplied to the works by the Sumitomo Steel Works at Osaka. The Works have their own steel plant for small castings and a well equipped forge house. The annual increase in the S.M.R. rolling stock required to handle the normal increase in the volume of traffic together with the rolling stock requirements of the new Chinese railways under construction in Manchuria has kept the Shakako Works busy. In fact, the press of new work has compelled the S.M.R. authorities to call in outside assistance. Orders for new all-steel railway cars and other structural steel work have been placed with the Dairen



50 Ton Electric Locomotive Built for the Fushun Colliery at the Shakako Works

Gauge of Track, 1435 m.m.

#### WEIGHT.

Net weight of locomotive..	44.09 k.g.
Ballast weight .. ..	6.90 "
Weight on drivers ..	50.98 "
Weight per pair of drivers	12.75 "
Weight of one motor ..	2.27 "

#### WHEEL BASE.

Total wheel base ..	6,324.5 m.m.
Rigid wheel base ..	1,600 "

#### MOTORS:

No. and size of motors ..	4-125 H.P.
Trolley voltage .. ..	1,200 volts D.C.

#### WHEELS.

No. of driving wheels ..	8
Diameter of driving wheels	1,016 m.m.

#### AXLES.

Diameter between wheels..	171 m.m.
Diameter at motor suspension .. ..	171 "
Diameter at gear .. ..	175 "
Diameter at journal .. ..	116 "

#### GEAR RATIO.

Gear ratio .. ..	1:5.53
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#### CAB.

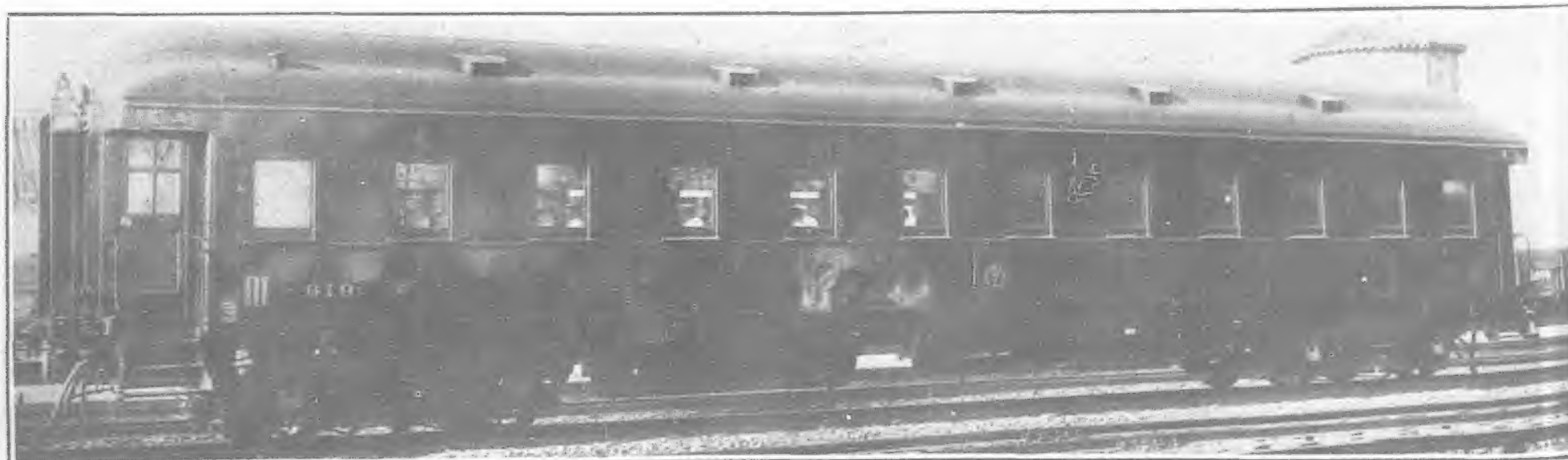
Type .. ..	Steel sloped.
Length over cab .. ..	8,941 m.m.
Height over cab from top of rail .. ..	3,353 "
Length bet. knuckle faces	10,972 "
Width over all .. ..	2,946 "
Height with trolley down..	3,518 "

#### CAPACITY.

Max. instantaneous tractive effort .. ..	12.88 k.g.
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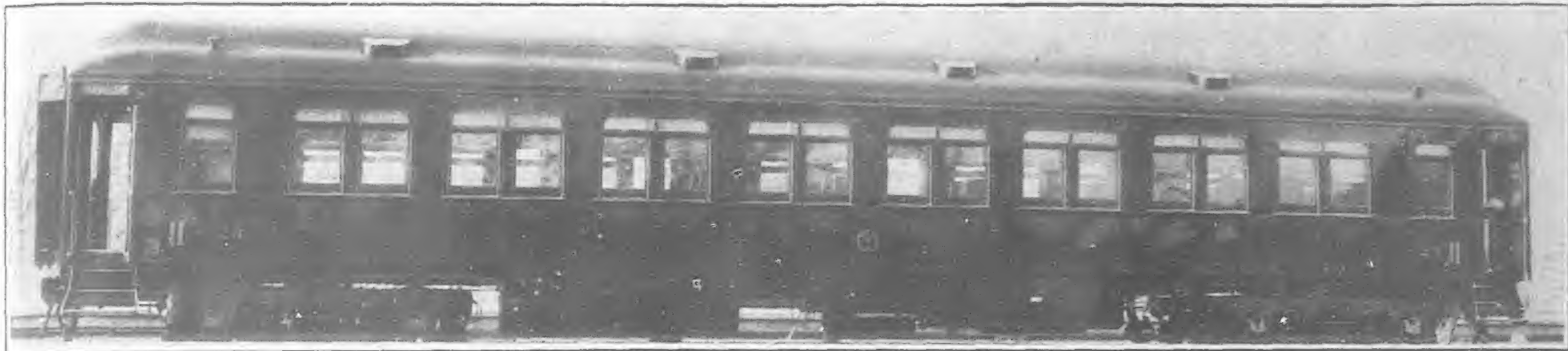
Engineering Works, and the Manchuria Dock Company. The erection of an entirely new machine shop at the Fushun Colliery has taken over practically all the work for that subsidiary enterprise of the S.M.R. In fact, the new industrial activities of the S.M.R., the expansion of its traffic requirements together with the possibilities opened up by the extensive program of new Chinese railway construction in Manchuria and Mongolia has created a local engineering market that justifies the hope of the management that the Shakako Works may be developed into an independent manufacturing enterprise.

For the present fiscal year 19 new locomotives are to be built for the S.M.R. Six of these will be of the Pacific type for passenger service and 13 Mikado type for freight. The Shakako Works will build the



All Steel Third Class Passenger Coach Built at the Shakako Works

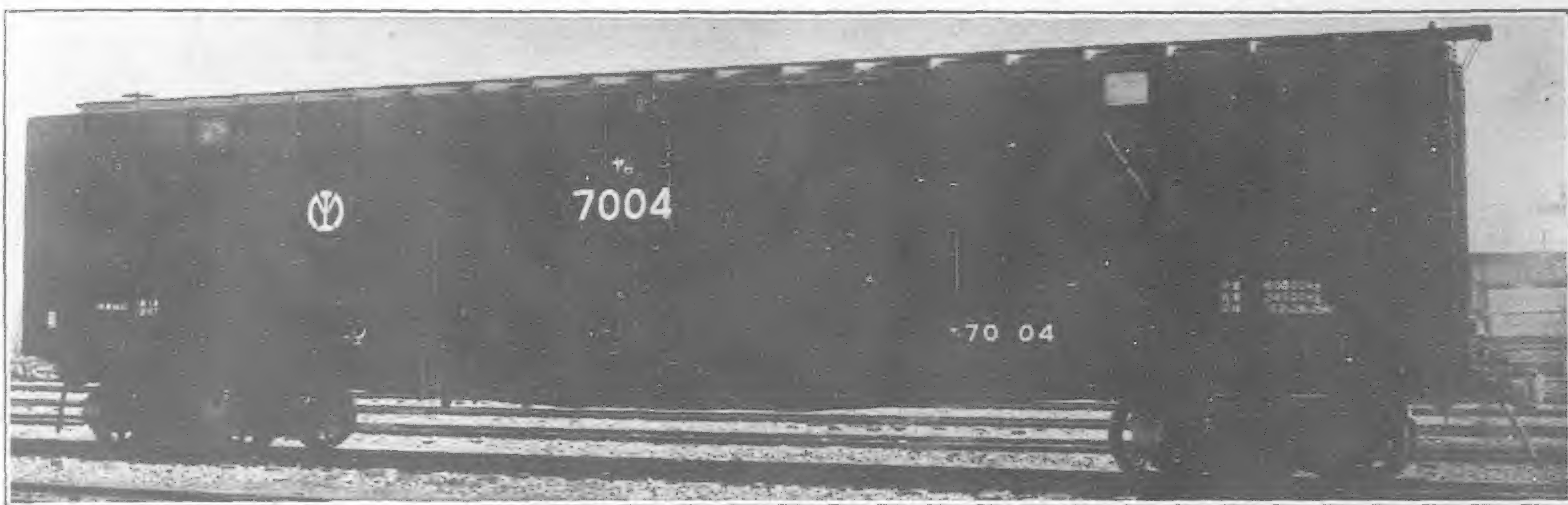




All Steel Second Class Passenger Coach Built at the Shakako Works

six Pacific type passenger locomotives and six of the Mikado type. The Kawasaki Dockyard has been awarded the contract for three Mikadoes and the Nagoya Railway Car Manufacturing Co. will build the other four. The contract price for the locos to be made at the Shakako Works is Y.97,000 per engine, while the Japanese manufacturers' bid was Y.131,000. This difference of Y.34,000 in the cost of manufacturing between Japan and China is of interest

coal mines, which this year will reach 8,700,000 tons. Most of the rolling stock expenditure for the current fiscal year will go towards the construction of new all steel 60-ton coal cars. Over 200 of these cars are already in operation. The estimates for 1928 provides for 400 freight cars of which 150 are 60-ton and the balance 30 ton cars. The estimate for building these 60-ton all steel cars in Dairen, we understand, is Y.13,000.

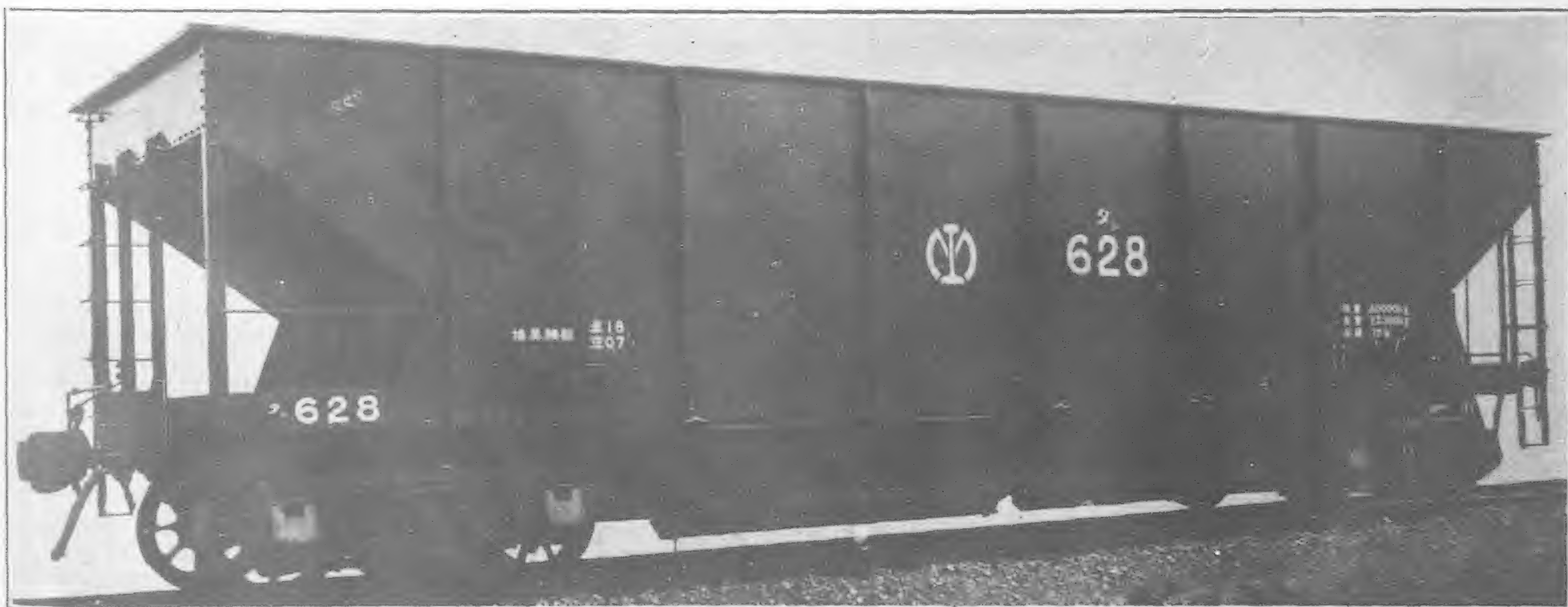


All Steel 60-Ton Freight Car Built at the Shakako Works

as denoting some of the handicaps Japanese engineering manufacturers must contend against in competing for export business, and which at present do not exist in China. These conditions, however, may be modified by the operation of the new Chinese protective tariff.

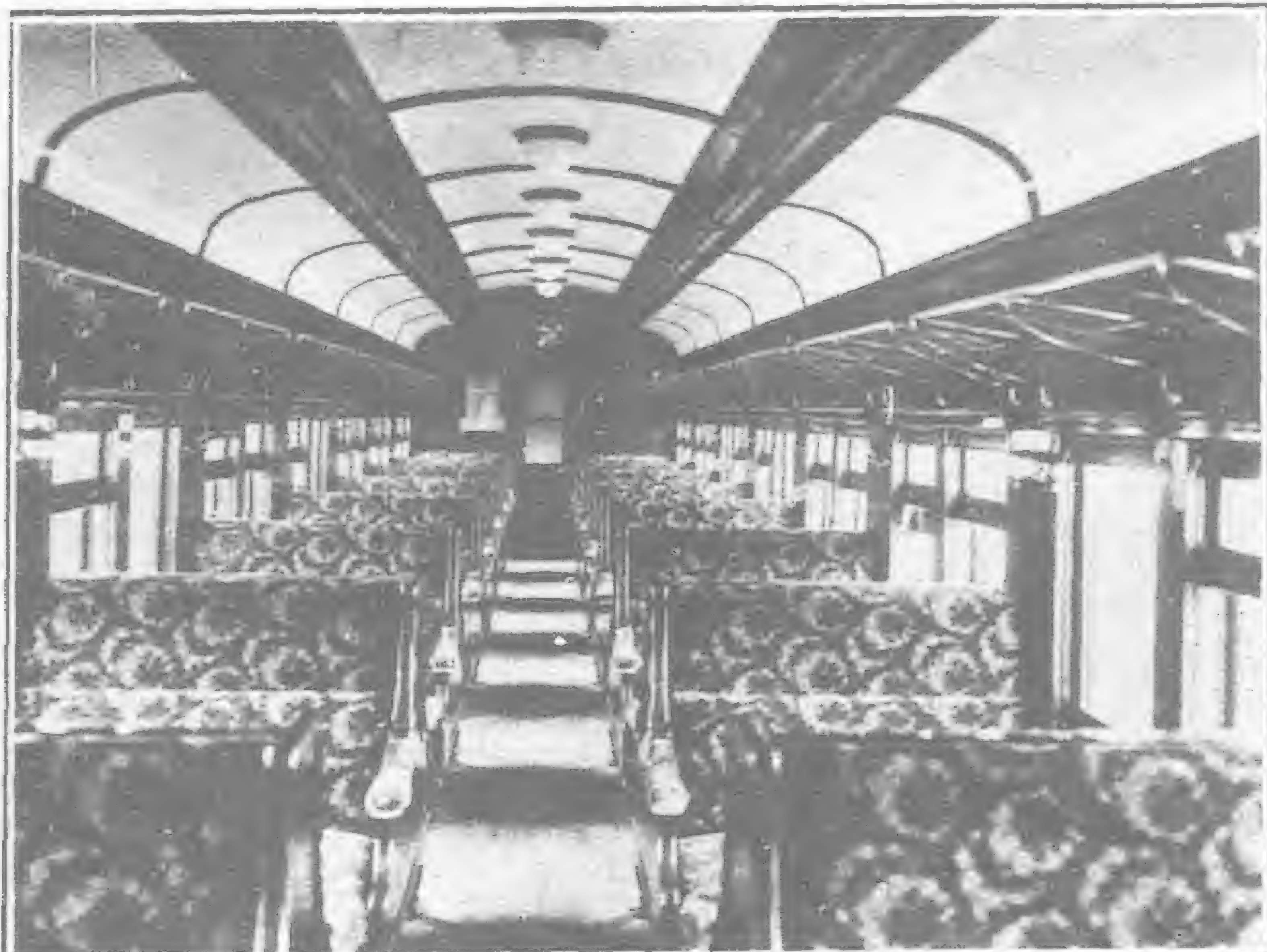
The transport efficiency of the S.M.R. lines must be increased to handle the combined outputs of the Fushun, Yentai and Panshihu

A further increase in the number of new goods cars will be necessary to handle the increased volume of freight for the current year. The actual volume of freight carried in 1927 was 18,427,775 tons, an annual increase of about 1,000,000 tons a year for the last ten years. The expanded output of the Fushun mines and the Anshan Iron & Steel Works in addition to the increase in crops arriving from the settlement and cultivation of vast tracts of virgin



All Steel 60-Ton Coal Car Built at the Shakako Works



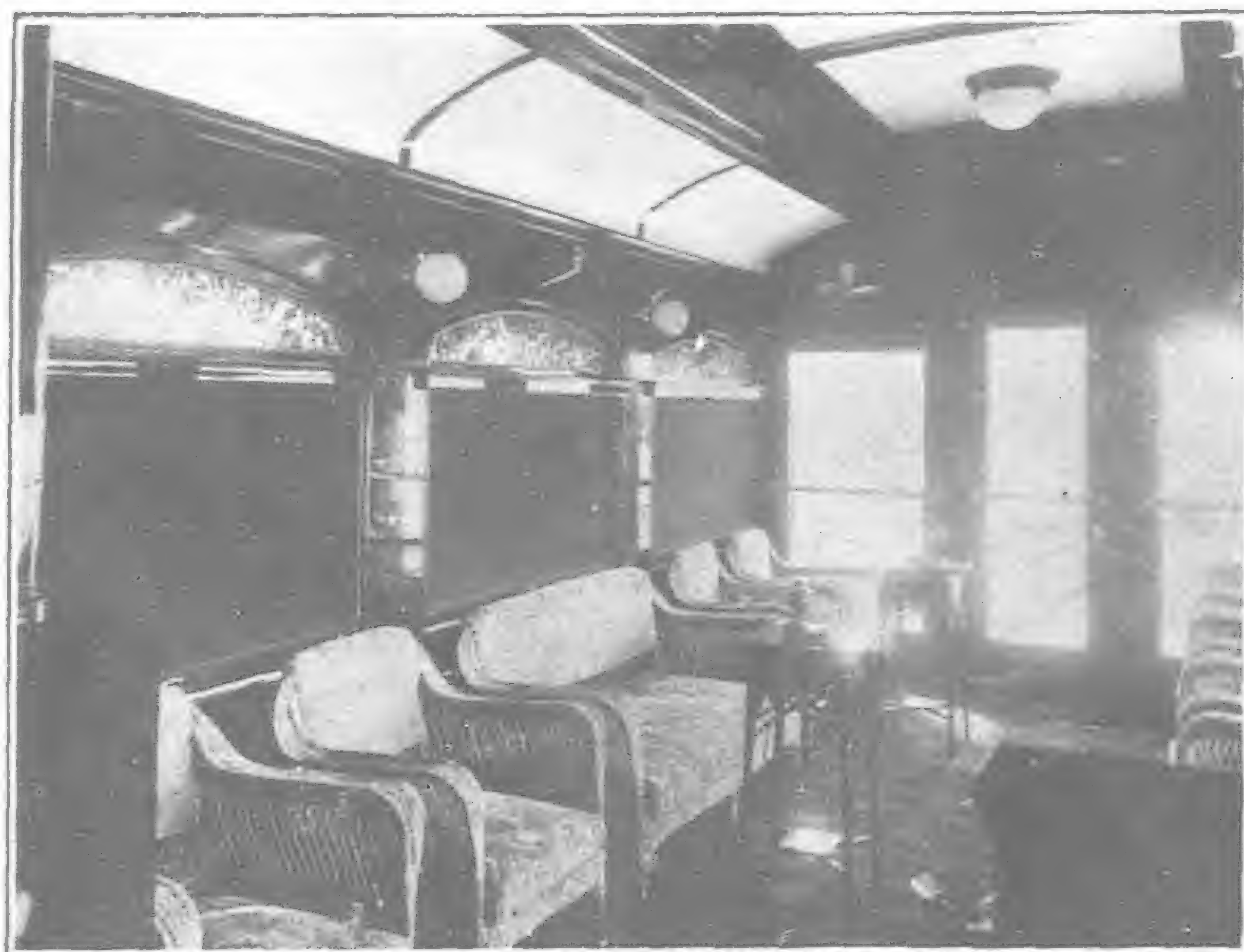


Interior of All-Steel Second Class Passenger Coach Built at the Shakako Works



Interior of All-Steel Third Class Passenger Coach Built at the Shakako Works

lands by the millions of home-seekers from North China, will easily increase the volume of freight for next year to over 20,000,000 tons. The steady construction of new Chinese lines in Manchuria feeding into the S.M.R. is also expected to raise the volume of traffic and provide an outlet for new rolling stock that will tax the capacity of the Shakako Works to meet. The electrification of the Open Cut Workings at Fushun, the Anshan Iron & Steel Works yards and the branch line to the Coal Loading pier at Kanching-tzu, will call for at least ten new electric locomotives of the Fushun type. Several of these locomotives now in operation were built at the Shakako Works and it is entirely probable that the additional equipment will also be turned out there.



Interior of Observation Car for the S.M.R. Built at the Shakako Works

Some idea of the rolling stock manufactured at the Shakako Works is given in the illustrations and particulars of the locomotives, passenger and freight cars accompanying this article. The Shakako Works are now building four Pacific type locomotives for the Ssuningkai-Taonan Railway. Locomotives have also been built at these works for the Chosen Government and the Indo-China State Railways.

The Shakako Works also manufacture cast-iron pipe of all sizes up to 1 meter in diameter. Practically all of the cast-iron pipe used in Dairen and on the towns along the S.M.R. is turned out at these Works, as well as valves and other fittings.

## Japanese Government Railways in Kyoto-Osaka District

(Continued from page 127)

the Kansai line and the Katamachi line will make a detour to the Osaka freight station *via* Suita.

### Osaka Harbor Line

The Osaka harbor line starts at Imamiya of the Kansai line and ends at Fukuzakimachi where it is joined with the Municipal pier line. It was nearly 30 years ago that the construction of this harbor line was advocated for the first time. But the opinion was divided as to whether the line should run towards north or whether to south, and it was finally decided on the present route, in consideration of the fact that there is the Nishinari line in the northern section of the city.

The work was commenced in August, 1923, under the joint investment by the Railway Office and the Osaka Municipality, of Y.5,960,000 and Y.6,110,000, respectively. The mileage extends to 5 miles and 20 chains. One of the striking features of this line

is that there are three lift-bridges on this short line, spanning across canals. This line is capable of transporting approximately 700,000 tons of freight a year.

In connection with this Harbor line, there is an important problem of building a large freight station in the southern part of Osaka city. At present, Imamiya and Minatomachi stations handle freight. Of the two, Minatomachi station is more important, and it dispose of 900,000 tons of freight a year. This Minatomachi station, however, is very small, and it must be extended, but there is no room to extend the station. It is true that a large portion of the foregoing 900,000 tons of freight accumulates at the Minatomachi station on account of its occupying an advantageous locality, but it is equally true that a considerable amount of it are being handled there on account of the lack of other proper freight stations. With this in view, it is planned to build a new freight station somewhere in the southern section of the city, but so far nothing definite is available.

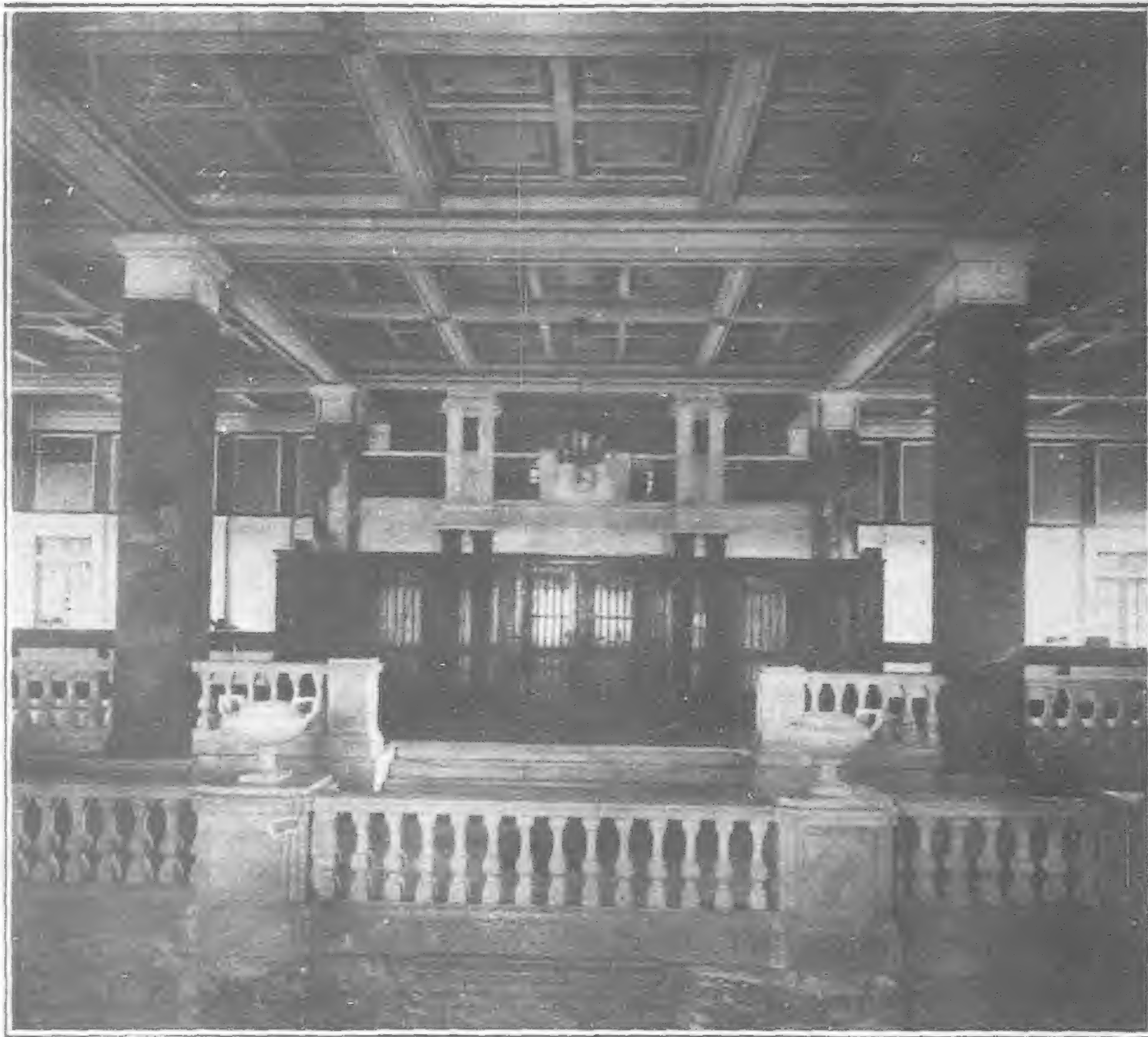


# The Modern Vault

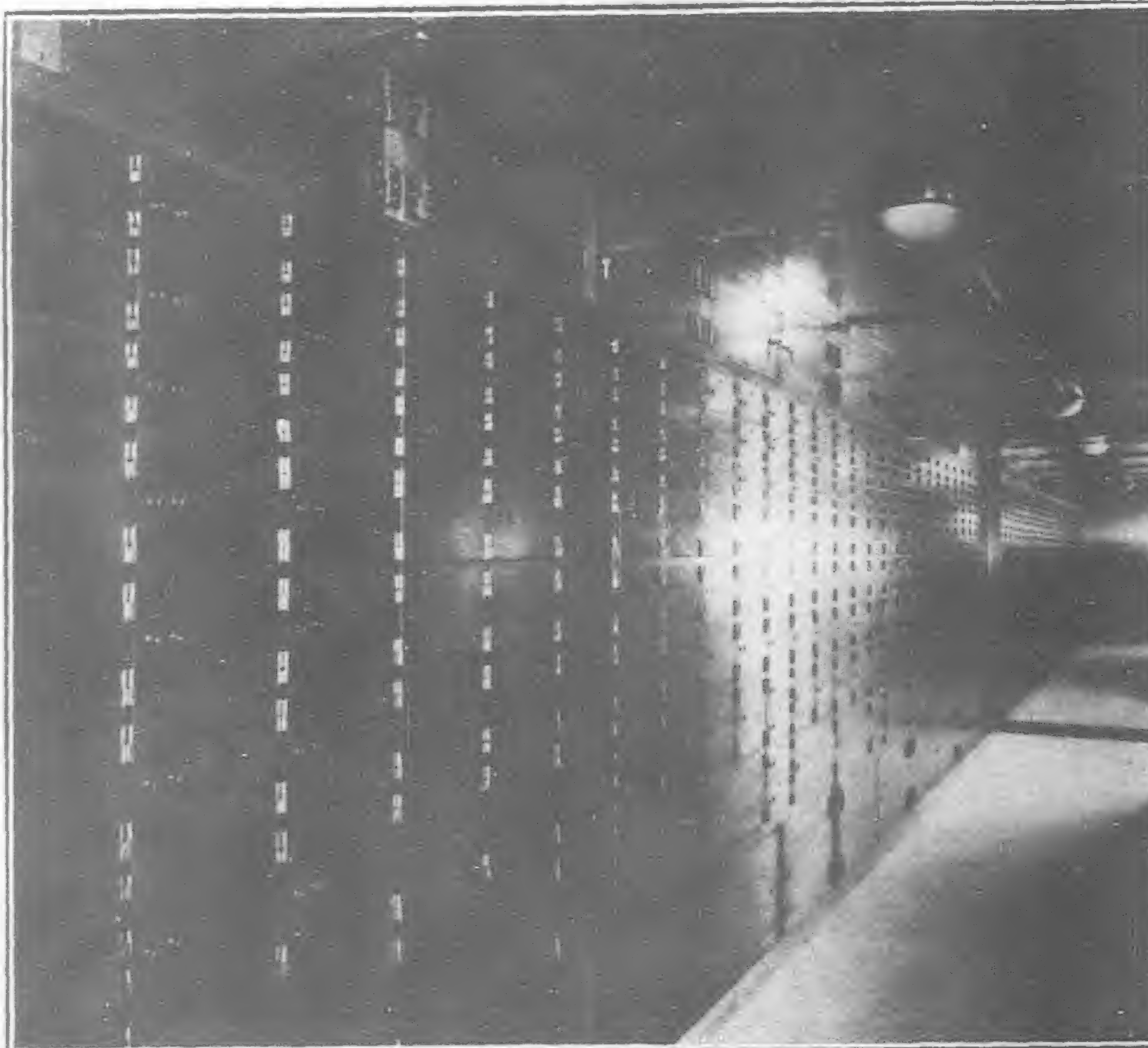
THE Bronze Entrance Door to Dr. Sun Yat-sen's Mausoleum in Nanking is being manufactured and installed by the York Safe and Lock Company, which has also installed the modern round door safe deposit vaults for the Kincheng Bank Corporation in Shanghai. The artistic design for the bronze door is in keeping with the general tone of the mausoleum, described so graphically on page 97 of this issue. Although Chinese temples are usually built entirely of wood, it was felt that reinforce concrete and bronze were more suitable media for so modern a personality as Dr. Sun Yat-sen. The York Safe and Lock Company is represented in China and Japan by the American Trading Company of the Far East, Inc.

In this connection, it is interesting to note the importance of modern vaults. The great vaults recently constructed for the Federal Reserve Banks in New York, Boston, Philadelphia, Cleveland, Cincinnati and Chicago, together with those vaults of large independent banks are absolutely protected against any known attack by robber or mob. For the Federal Reserve Bank in Chicago the manufacturer used 3,500,000 pounds of steel and steel products. Each of the six revolvable entrances for the Federal Reserve Bank, New York, weigh in excess of five hundred thousand pounds (500,000 lbs.)

The main round door for the Cleveland Federal Reserve Bank weigh two hundred



The Kincheng Bank, Shanghai



The Safe Deposit Vaults of the Kincheng Bank

thousand pounds while the hinge and bearings weigh an additional seventy thousand pounds. This door is ten feet in diameter and over seven feet in thickness overall. Incredible as it may appear, this huge door may be started from a dead center and moved freely back and forth with the mere force or pressure exerted by a finger of one's hand. In no other mechanical product has anti-friction devices been employed that in any sense equals the devices used for the operation of a bank door. These doors are formed of heavy sections of various kinds of steel, alternating in succession to offer the maximum degree of protection.

The heavy steel casting which forms the shell of the door is of great tensile strength, into this is poured infusite while in molten shape. This nonfusible metal resists the action of the oxy-acetylene cutter, burner and welding torch. Also incorporated in the door is chrome steel for resistance to the burglar's drill and open hearth steel to resist explosives. After the door is closed it is secured by massive round bolts thrown by a large pilot hand wheel. The bolts controlled by two combination locks working in conjunction with a four movement time lock.

The walls, floors and ceilings of these vaults are built up of shock proof steel and steel alloyed plates arranged in large overlapping sections with widely broken joints and secured with chrome steel screws. Surrounding these steel walls are heavy reinforced concrete walls.





The Bronze Door of Dr. Sun's Mausoleum

These large vaults were designed and built by the York Safe and Lock Company in their factories located at York, Pennsylvania, U.S.A. From one small brick building with crude machinery, this company has, in forty years, grown to be the largest plant of its kind in the world.

There are many seemingly unrelated trades practised by the one thousand and more factory employees of the York Safe and Lock Company, yet each has its place and part in the Company's finished product. For example, blacksmith and glaziers, sheet metal works and cabinet makers, plate and structural steel workers and locksmiths, drillers, tappers and tinsmiths, grinders and polishers, rubbers and body painters, machinists, furnace men, hardeners and testers, carpenters, pattern makers and electricians, foundry men and time lock experts, oxy-acetylene cutter men and shop tractor men, tool makers and assembly men, all necessary to produce this high class specialty work.

## Restricted Output Assists Japanese Coal Industry

By Consul Henry B. Hitchcock, Nagasaki

During the years immediately following the World War the Japanese coal mining industry was stimulated to over-production, which reached its peak in 1925. Heavy losses occurred that year, and the mining companies agreed to a definite rate of reduced production for 1926 to relieve the situation. This agreement was fairly well followed, and resulted in marked decreases in the stocks on hand at the end of the year.

As a consequence, good prices for coal prevailed throughout 1927, and they remained steady even during the three weeks of the moratorium, when cash was required with orders. Prices for all grades of coal showed an average increase of 5 per cent. over the corresponding quotations for 1926, and are still relatively high, by comparison with those for other commodities. Coal now costs three times as much as before the war, while the average of all commodities is only two and one-fourth times the pre-war average.

At the beginning of 1927 stocks on hand amounted to 1,370,000 tons. The low point for the year was reached in April, when they were reported at 1,041,000 tons. At the end of the year they had increased to 1,610,000 tons, but without appreciably affecting the price. The exceptional prosperity in shipping to neighboring countries during the first half of the year kept the stocks down and the prices up. This would normally have resulted in increased production, with the possibility of over-production, if it had not been for uncontrollable factors of restriction, such as the recurrent labor troubles in the Tokiwa mines and the financial stringency which forced the smaller mines out of operation. Another factor was the institution of health insurance, which greatly increased the ratio of absences for sickness among the mine laborers during the year.

The territory included within the Nagasaki consular district produces more than two-thirds of the coal mined in Japan proper. In 1927 this district produced 23,079,000 metric tons of coal, compared with 22,542,000 tons in 1926. The principal producing center is Fukuoka, which furnished more than 17,000,000 tons of the total in each of these years.

The 1927 increase in production is about 2½ per cent. The market is said to have been maintained during the year no less by the demand from the industries than by an increased demand for household purposes. For example, there was an increase of 9 per cent. in the consumption of coal for the manufacture of gas. During recent years the household demand has been greatly increased by the marketing of stoves especially adapted to the burning of coke and coal in houses of the Japanese type, together with the higher prices charged for charcoal and wood. The per capita consumption of coal in Japan is now about a half ton a year.

Usually Japan has an excess of coal exports over imports amounting to from 600,000 to 1,000,000 tons, but in 1927 there was an excess of imports of about 500,000 tons. Exports from the Nagasaki district dropped from 2,514,760 tons in 1926 to 2,111,441 tons in 1927, those to China declining from 1,748,188 to 1,333,599 tons. This decrease in sales to China is the most noteworthy item in the record for the two years. More or less effective boycotts against Japanese goods, the higher price of Japanese coal as compared with that from other sources, the less favorable exchange rates ruling throughout the year and the reduced purchasing power of the Chinese are the chief factors in this decrease. Since a single Japanese firm has a considerable measure of control over the coal market of the Orient, there are not infrequently variations in the quantities exported to different countries which do not correspond to normal supply and demand. Matters of business policy not directly connected with coal may affect prices quoted and quantities shipped.

The Japanese exports to the principal destinations in 1926 and 1927 follow:

### Japanese exports of coal, 1926 and 1927

Destination	1926	1927
China .. ..	Metric tons 1,775,000	1,361,000
Hong Kong .. ..	259,000	374,000
Straits Settlements .. ..	245,000	202,000
Philippine Islands .. ..	155,000	148,000
United States .. ..	16,000	—
India .. ..	4,000	2,000
Other countries .. ..	136,000	86,000
Total .. ..	Metric tons 2,590,000	2,173,000



Fig. 2.—70 KV Outdoor Switching Station Modjokerto During Erection



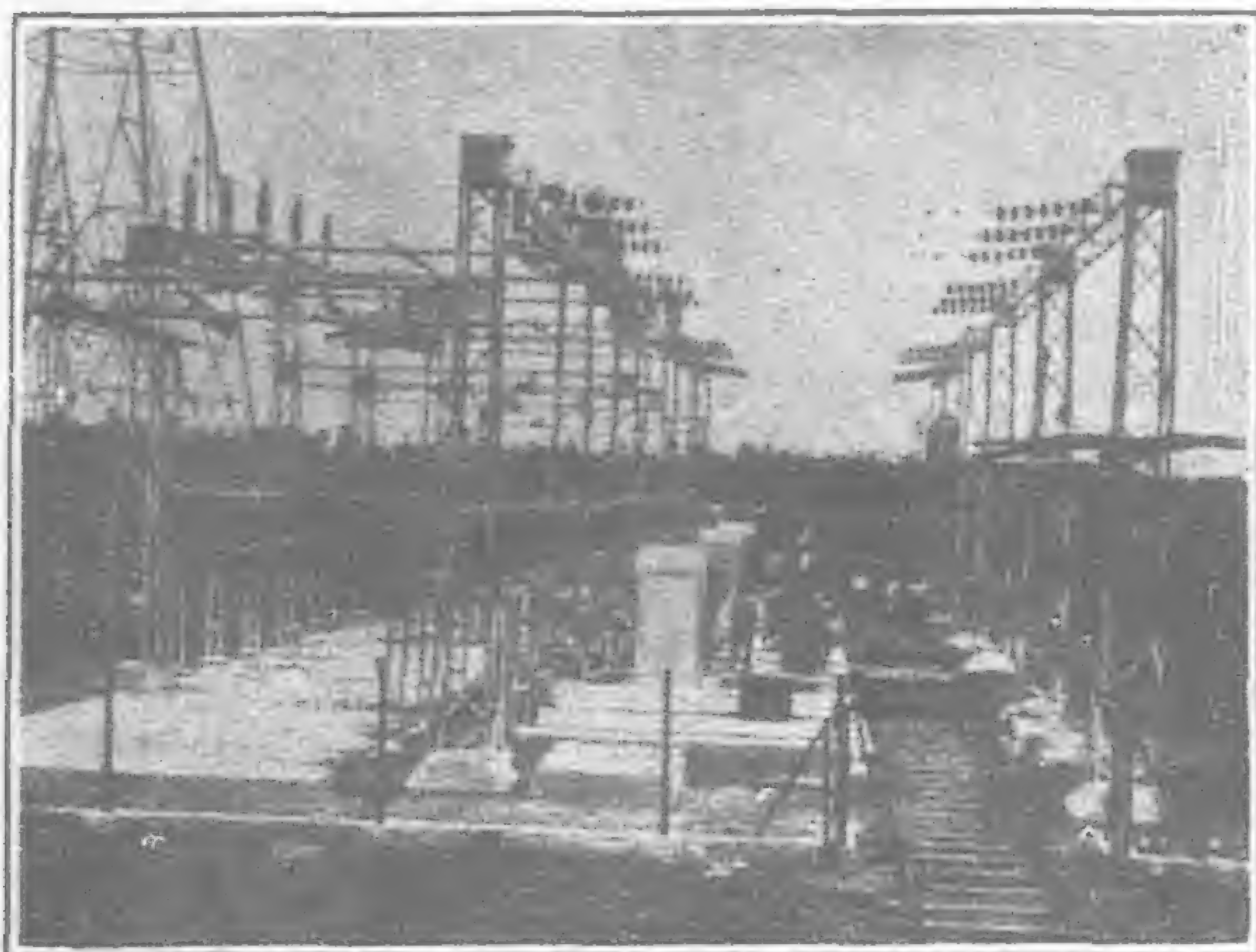


Fig. 3.—70 KV Outdoor Switching Station Modjokerto During Erection

suppressors and five sets of 70 KV Bendman excess voltage arrestors.

As the plant had to be specially designed for the extremely severe tropical conditions existing at the site of erection, it includes many singularly interesting features that are not to be found in plants in European countries; however these cannot be discussed at this juncture. A few illustrations will serve to depict the most interesting station, namely the outdoor switching station at Modjokerto.

The entire plant can be seen in Figs. 2 and 3, which represent photographs taken from two different sides. The two 500 KVA transformers can be seen on the left or right hand sides of the illustrations. The bushings had at that time not been installed. The transformers are standard oil-cooled types with corrugated tanks and were supplied by the AEG. When designing these transformers, consideration had to be given to the high temperatures, induced by the very intensive sunshine. The transformers are separated from the H.T. apparatus by a rail track.

The outdoor erection of the equipment in such an intensely tropical climate naturally subjected it to great demands. Account was taken of this fact by allowing for ample insulation, fitting special spark-gaps on the bushings of the apparatus, etc. The steel structure and apparatus are galvanized. The supporting structure

and reliable technical equipment. It may, for instance, be mentioned that the network is equipped with a complete system of distance relays and earth leakage relays, as well as Petersen arcing ground

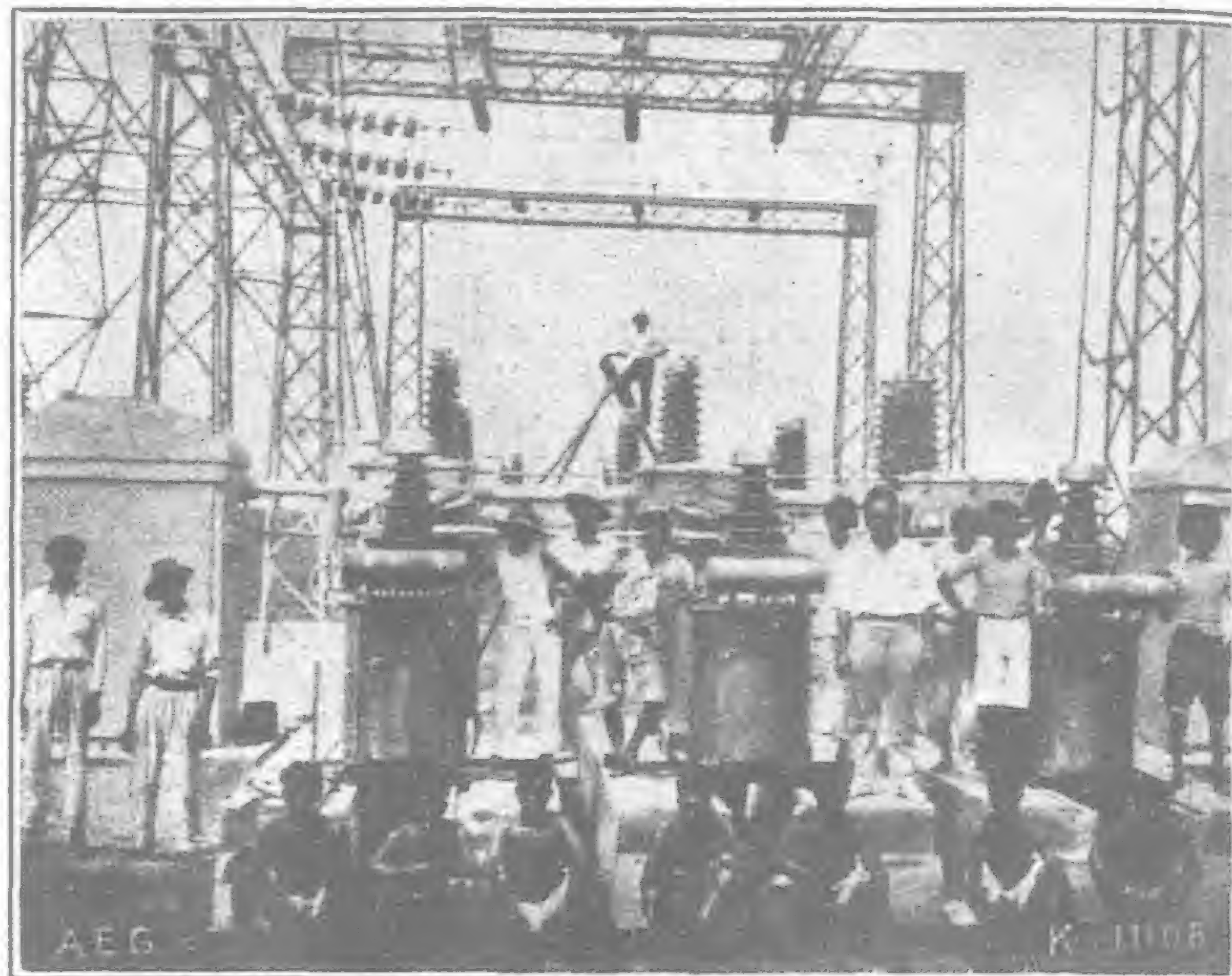


Fig. 5.—70 KV Equipment and the Erecting Personnel

and smaller parts are hot-galvanized, whilst the large oil tanks are galvanized by a spraying process. This special protective measure was essential, because the usual coat of rust-proof paint is not able to withstand the heavy torrents of rain and the intensive sunshine immediately following.

Fig. 4 shows the large end tower of the station, on which the double-circuit line, to and from Soerabaya and Mendalan, is strung. Oil circuit-breakers are inserted in the incoming line and will be installed in the outgoing line at a latter date. "By-pass" connections are also provided in the station and enable a direct connection to be effected between both pairs of lines without the inter-connection of circuit-breakers.

The initial stages of erection are illustrated in Fig. 5, which shows the native laborers and the skilled erectors.

In addition to the briefly described 70 KV East Java network, the older 70 KV West Java network, which is under the management of the State owned company "Waterkracht en Electriciteit," also plays a prominent part in supplying the Island of Java with electricity. Among other equipments for this network, the AEG supplied the entire H.T. material for the hydro-power station Oebrog. The most noteworthy order recently obtained was for plant to be employed in the extension of the 70 KV sub-station at Buitenzorg, which is illustrated in Fig. 6. The oil breakers supplied by the AEG can be seen in the foreground of this illustration.

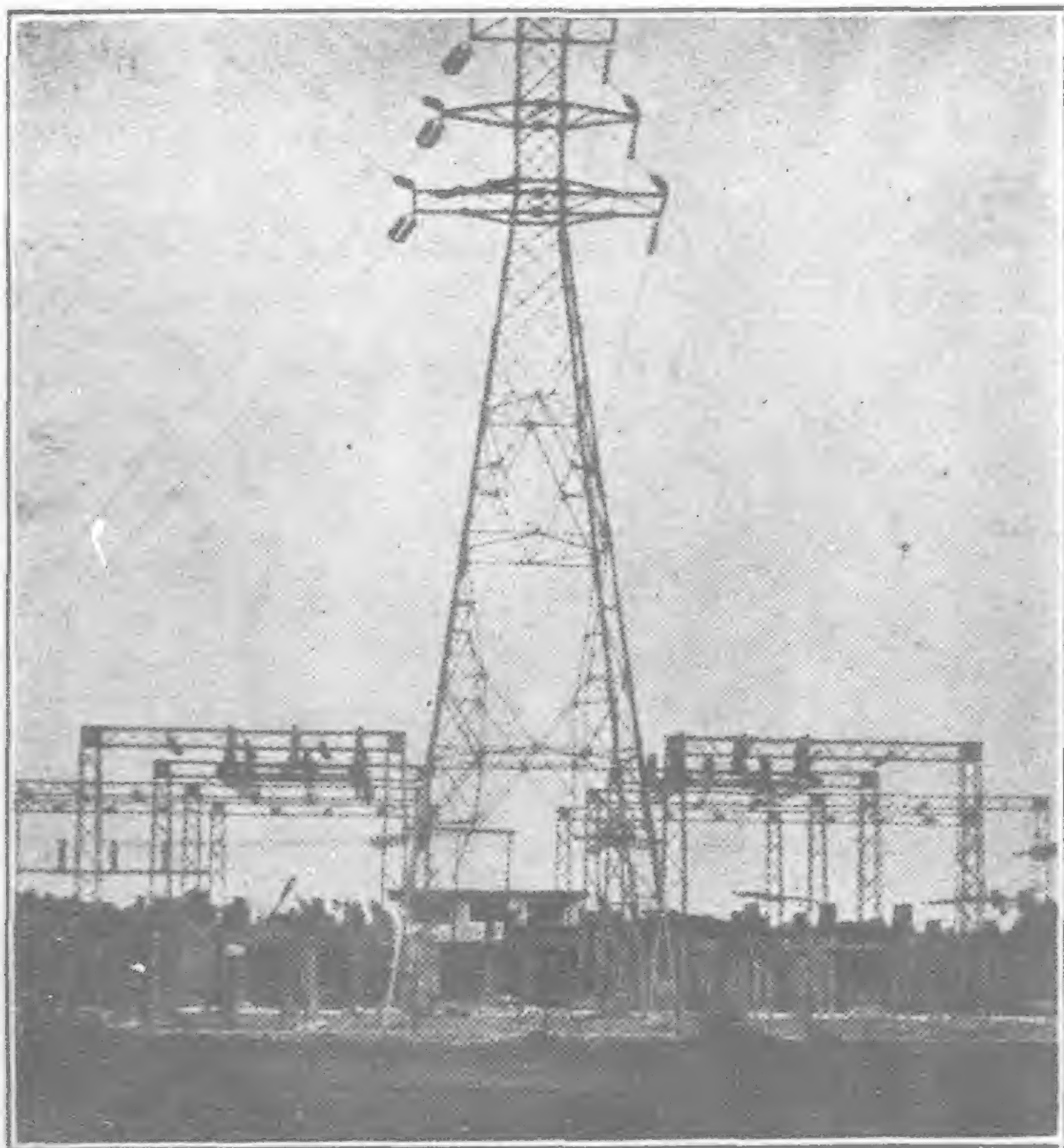


Fig. 4.—70 KV End Tower at the Sub-Station Modjokerto.

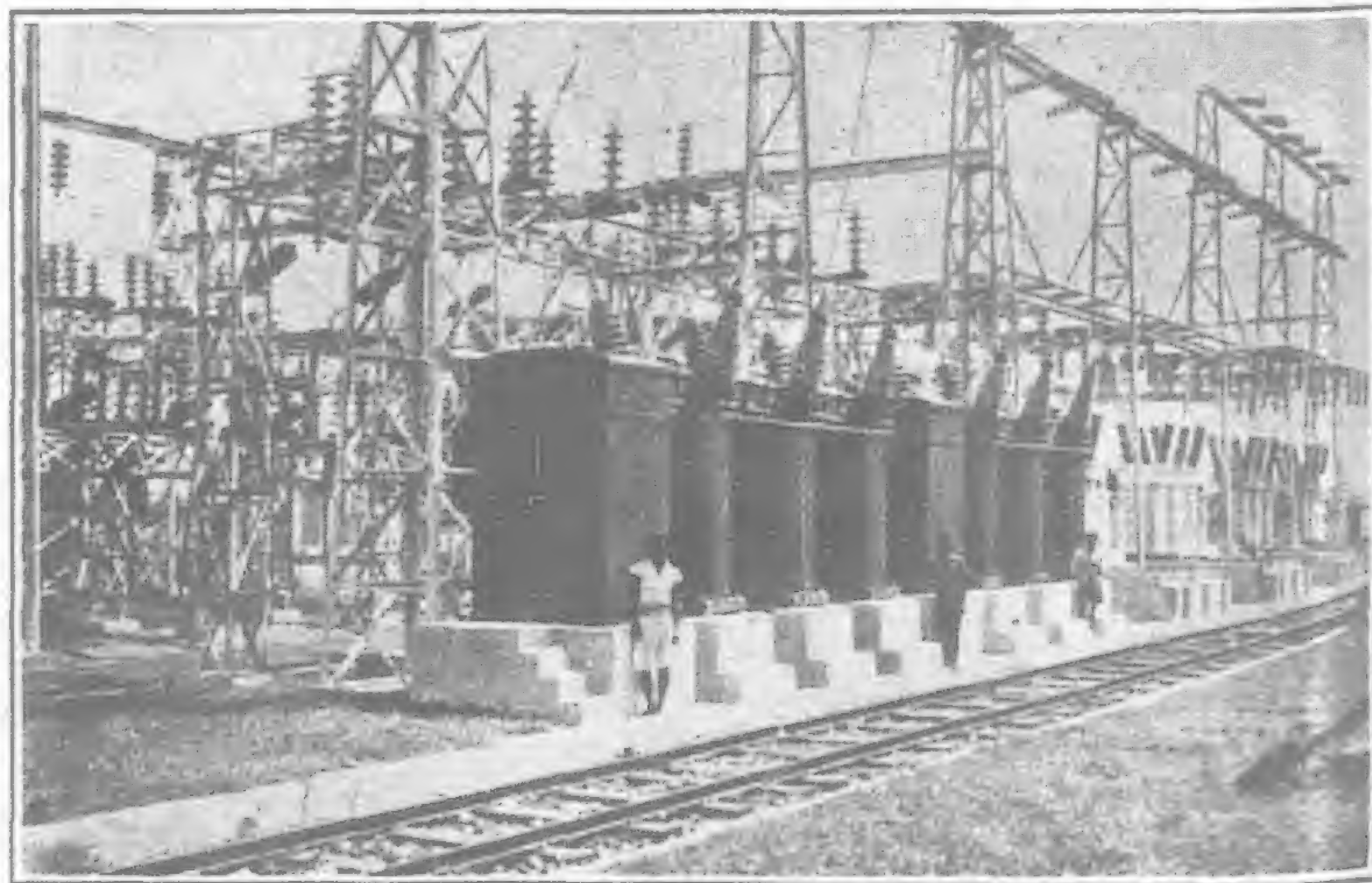
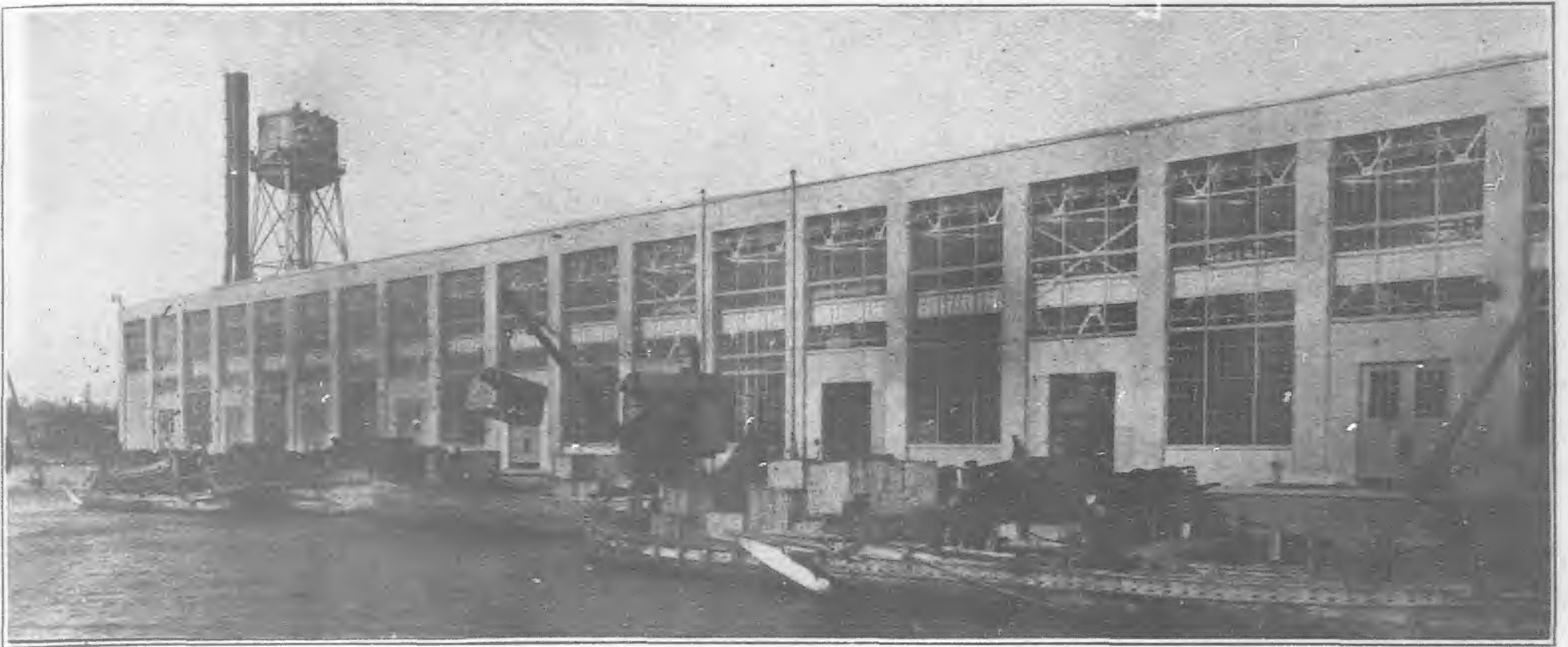


Fig. 6.—70 KV Sub-Station Buitenzorg





View of Part of West Side of New Ford Plant at Yokohama

## The New Ford Plant at Yokohama

THE opening of the new Ford Plant at Yokohama marks a tremendously progressive step in motor car manufacturing in the Far East. Mr. Henry Ford's confidence in Japan and in Far Eastern business is thus given a concrete expression. The increased purchase of motor cars in Japan and the building of roads in China, Manchuria and Korea will undoubtedly result in the purchase of an increased number of motor cars, so that Mr. Ford is justified in backing his judgment by being the first to put his money into a factory in Japan and an assembling plant in Shanghai.

The Ford Motor Company of Japan, Ltd., is just entering a new period of expansion. The new model cars and trucks have won the approval of the Japanese public, and while heretofore they have only been available in very limited quantities, coincident with the opening of the new plant they will be able materially to increase operations.

In the United States the Ford has regained first place after having been out of the market for months, and it is expected that in the very near future it will also regain supremacy in Japan.

Twenty years ago the site where now stands the modern Y.2,700,000 Ford plant at Koyasu, Yokohama, was a part of Yokohama Bay. A considerable area along Koyasu beach near Higashi Kanagawa was at that time reclaimed by hydraulic filling operations to a maximum depth of 15 feet.

Two years ago the Ford Motor Company of Japan, Ltd., feeling the need for expansion of its factory operations in Japan, purchased unoccupied ground amounting to more than 8,000 tsubo as a site for a new

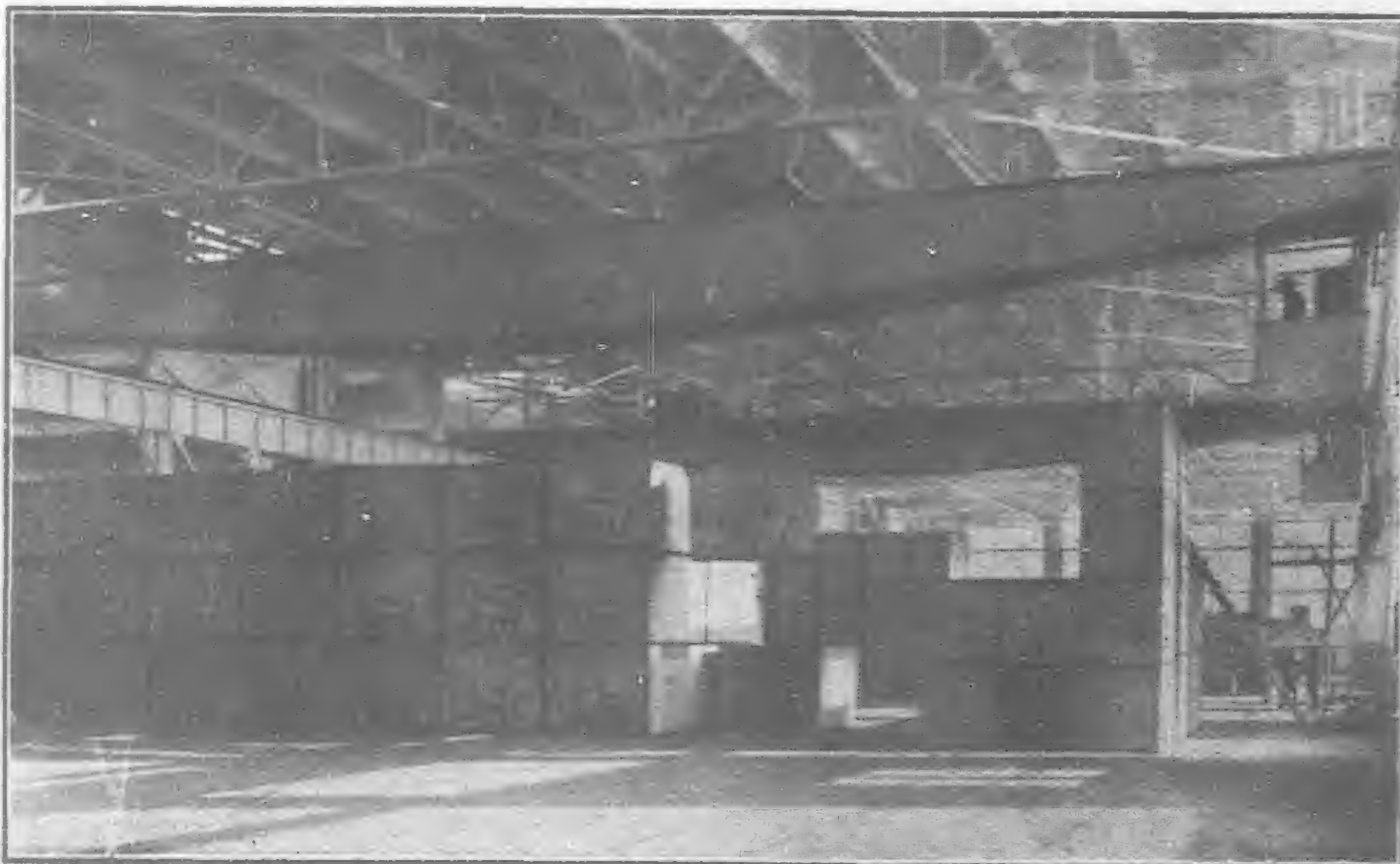
plant. The area purchased was a part of the reclaimed land near the town of Koyasu, on the edge of Yokohama Harbor and facing the Yokohama-Tokyo highway.

The contract for handling the complete designs, construction and mechanical equipment for the new plant was placed with the H. K. Ferguson Company.

Construction operations began in September, 1927, with an investigation of the building site. Foundation borings to a depth of 80 feet were made on four representative points of the site to determine the general character of the ground at that depth. Wood and concrete test piles were sunk and soil bearing tests were made at and just below the surface of the ground. The results of these tests showed the location of a possible base for the foundations at a depth of 18 feet. Concrete piles of the MacArthur type were sunk to this hard stratum as supports for the building. The piles were capped off with reinforced concrete caps including rigid tie beams in all four directions between the pile caps.

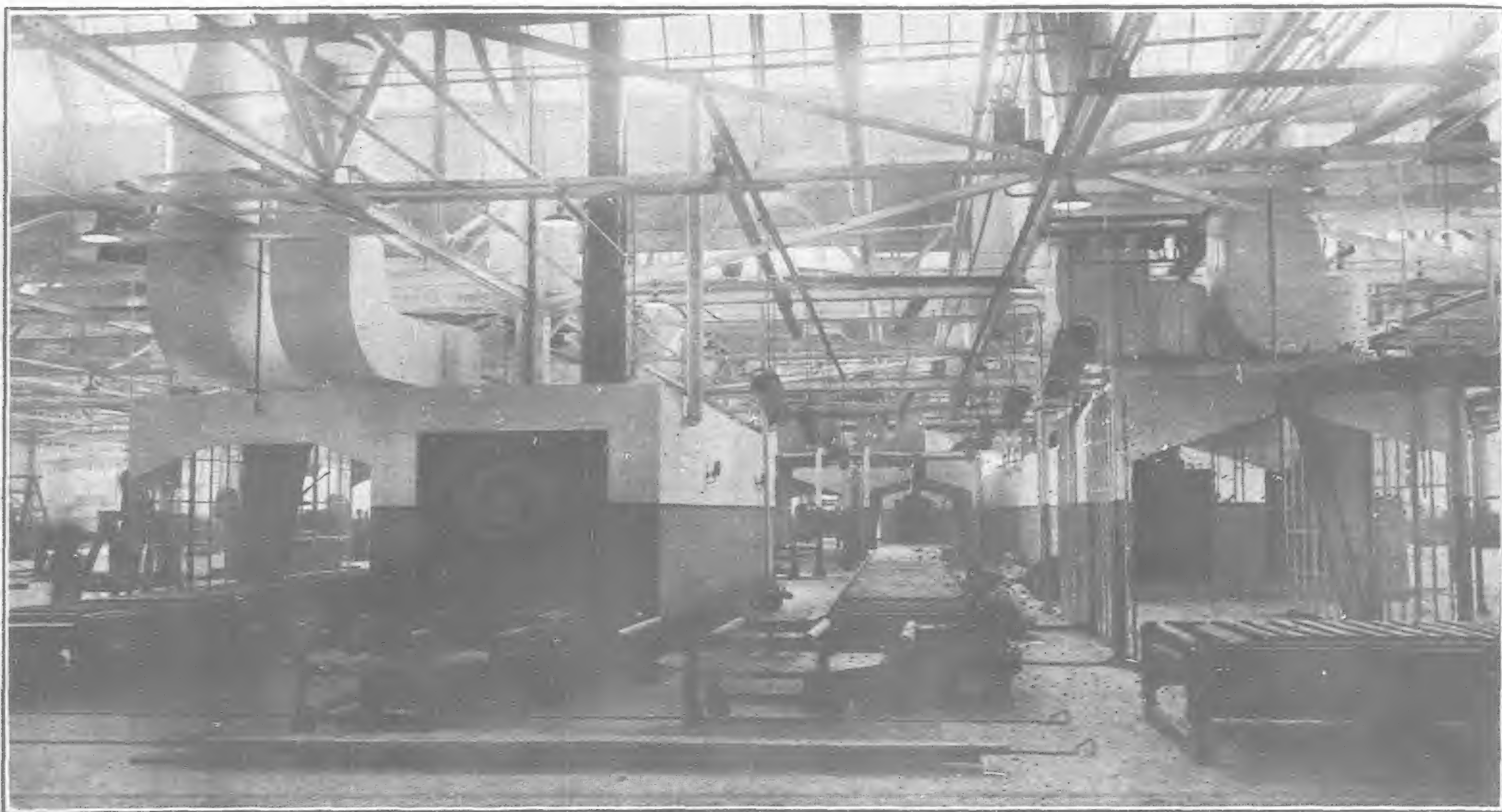
The design for the piles was made in Japan by the Ferguson engineers, but the plan for the superstructure were drawn up in the K. H. Ferguson main office in Cleveland, the general layout being designed in co-operation with the Ford Company main office in Detroit to include all factors developed in motor car assembly by the Ford Company.

The building may be divided essentially into two parts, the warehousing section and the assembly section, the latter including an office section. The new plant is a steel frame structure of the saw tooth type with reinforced



Rapid and efficient facilities for handling material are essential in a modern automobile plant. In the new Ford plant, the two five-ton cranes made in Japan perform this function in a highly satisfactory manner. The span of these cranes, 83 feet, is unusual for Japan. The warehouse has an area of 669 tsubo.





Interior View Showing Body Ovens and Paint Booths, Body Polish Line, etc.

concrete walls. The building is designed to afford ample head room and light and a minimum of maintenance.

The new plant is classified as semi-fireproof. Steel sash of various types selected to meet different requirements is included in the construction as well as a large quantity of mechanically operated continuous top hung sash on the north face of the saw teeth in the roof.

The floors in the assembly section are, in general, concrete monolithically finished, while the warehouse floors are of wood block for heavy service. Special types of flooring have been used in the office section such as linoleum, rubber tile and terrazo.

The washrooms in the factory have been elevated to mezzanine height to conserve floor space. Few interior partitions will be found in the new plant and most of those are of the movable type, some being of heavy wire mesh and others of steel sash.

The office section, which is in the south east corner of the building, includes show rooms, private offices, general offices and a garage.

The building is covered by a three inch wood plank roof of dressed and matched lumber fastened to wood nailers on steel purlins.

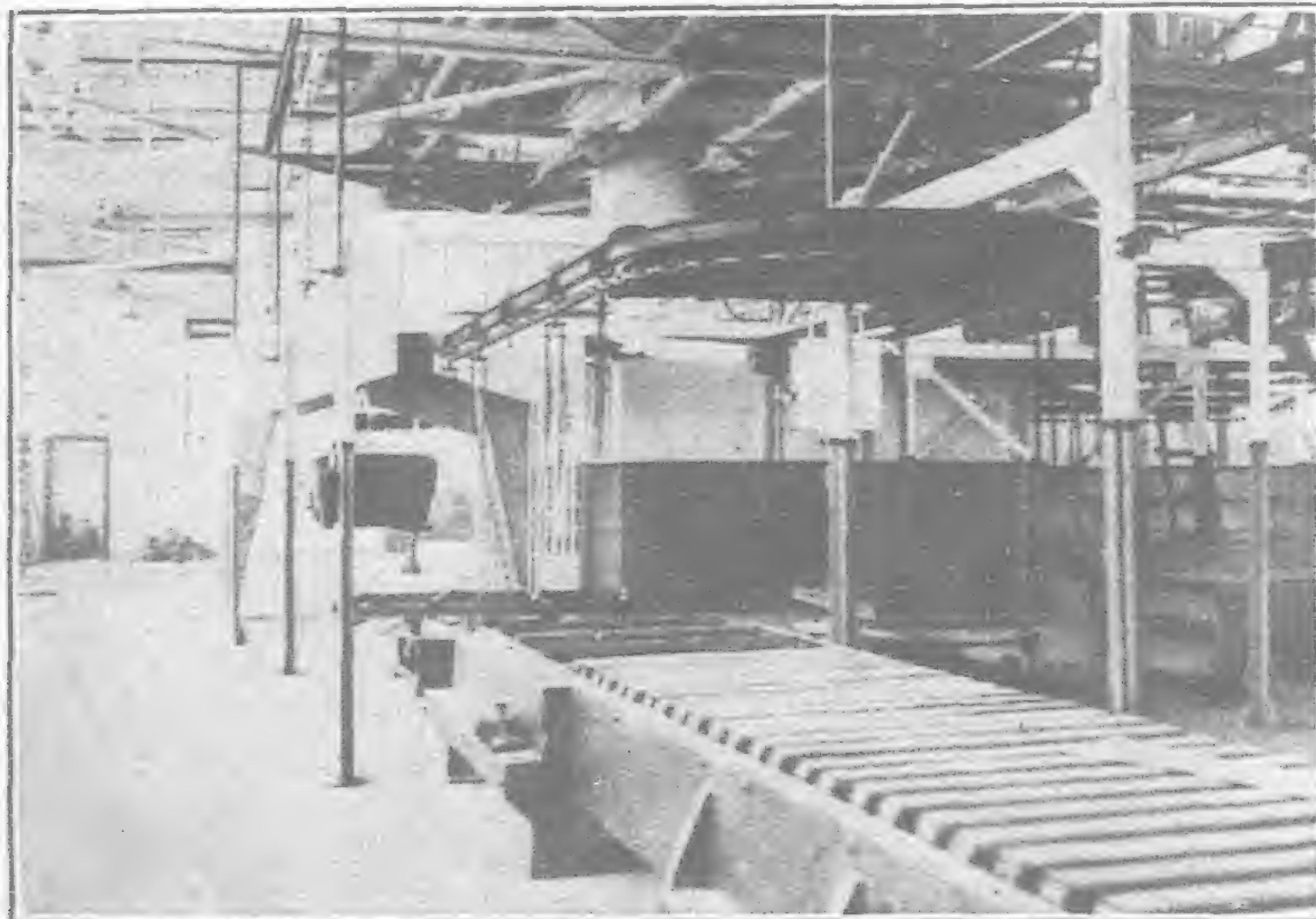
This wood deck is covered with asbestos plate for fire-proofing, insulation board to prevent heat and a heavy built up water proof roofing surface. All surfaces projecting above the general roof level are covered with copper, insuring permanency and reducing depreciation to a minimum.

Besides the main plant, there is a fire-proof building for housing the pyroxylin paints and for oil storage, specially constructed so as to be safe from fire or explosion.

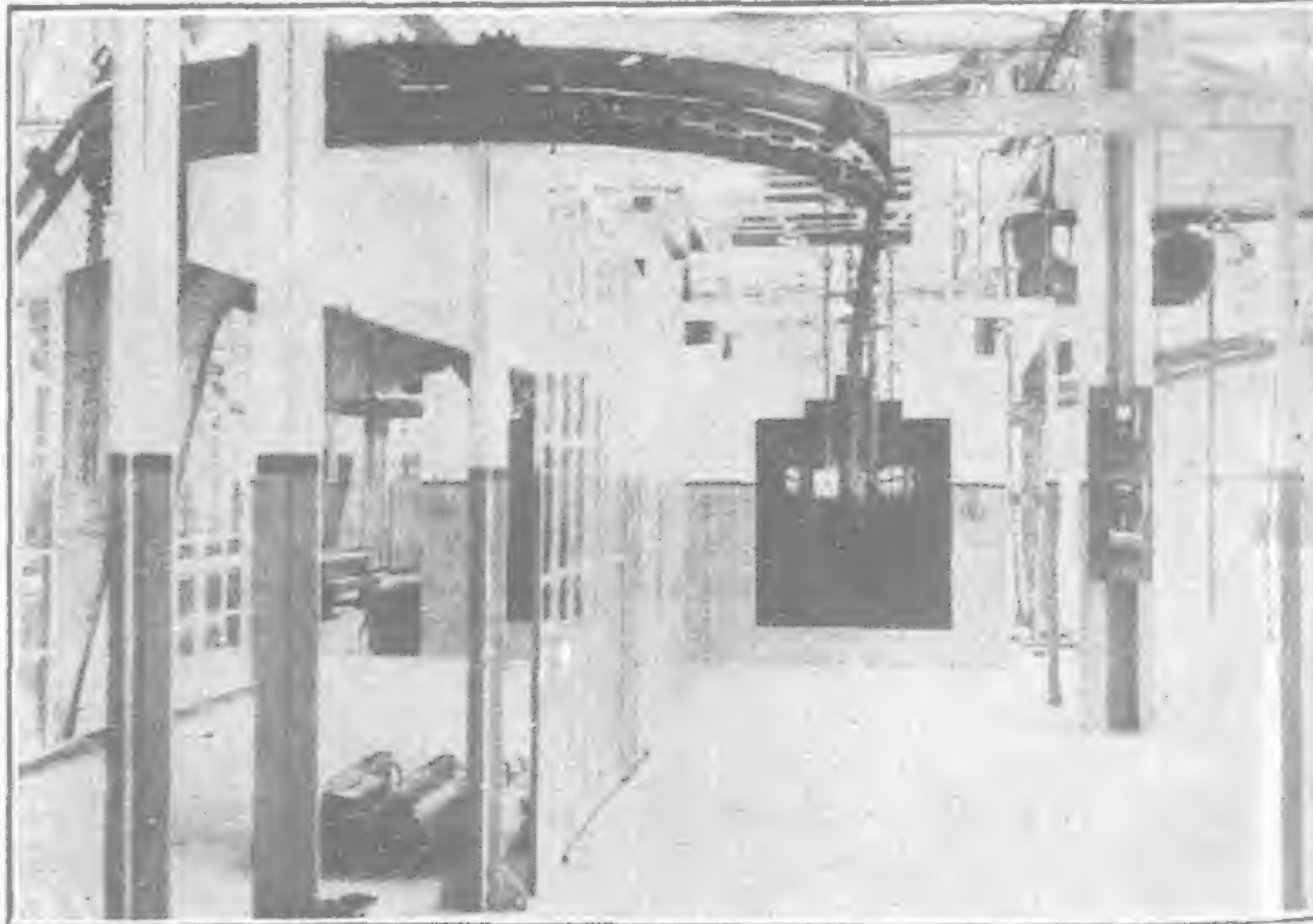
One of the transportation features is a loading dock with steel frame, covered by a roof and with sides enclosed with steel sash. This is for rail shipments. Various tanks for motor oil, fuel oil, and gasoline are sunk underground and coal and ashes are handled below the ground surface. The building is equipped with septic tanks and outside the main plant stands a sprinkler tank of steel construction, having a capacity of 50,000 gallons.

Provision in the building plans has been made for the possible construction at some future date of another plant unit in the south end of the building site.

*(Continued on page 140)*



Body Conveyor on which Car is Completed



Showing End of One of the Body Ovens





Avros, Medan

Palm Oil Mill "Poeloe Radja," East Coast of Sumatra



Avros, Medan

Narrow Gauge Railway Transport of Oil Palm Fruit to the Mill

# Expansion of Palm Oil Industry in Sumatra

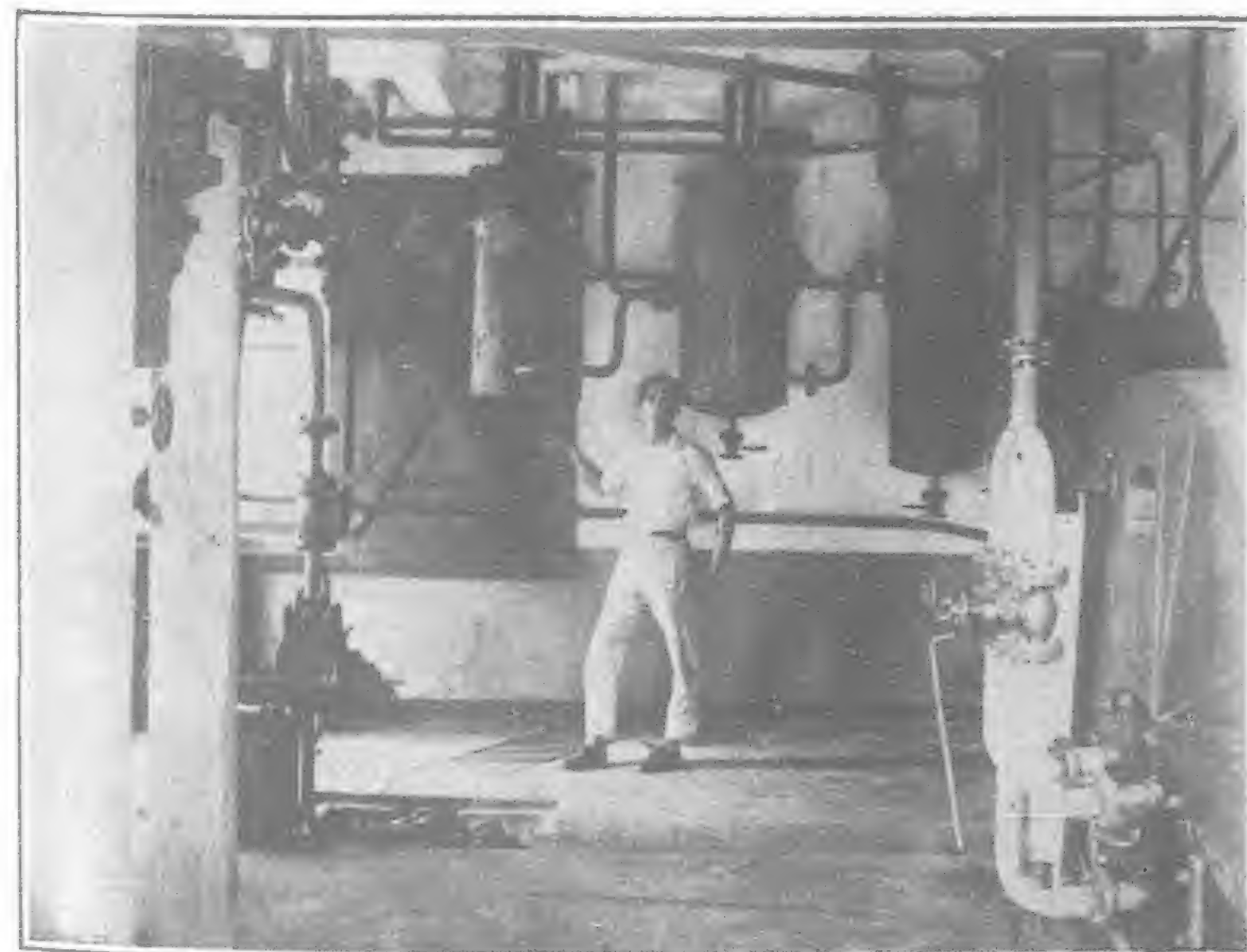
By K. R. F. Blokzeyl

**D**URING the last decade strenuous and successful efforts have been made to increase the area under West African oil palm (*Elaeis guineensis*) in Sumatra and South Acheen, D. E. Indies. Merit is due, in the first place, to a Belgian rubber concern, the "Société Financière des Caoutchoucs" which by the end of 1914 already had a planted area of some 5,600 acres. When this pioneer company had conquered nearly all obstacles hampering oil palm growing, several other companies started, since 1918, the industry on a large scale. As a result, the estate cultivation extended rapidly and on a much sounder footing than before. Whereas originally the view was held that the industry could be made remunerative on a low capitalized basis, the new companies worked on an intensive scheme with large amounts of capital. To produce large and continuous harvests per acre with small transport expenses and a high yield of oil, it is necessary to thoroughly clear the soil, to watch a careful upkeep of plantations, to build a network of narrow gauge railways for transport and a large and well equipped mill. Thus a large amount of capital has been invested in the palm oil industry at present, and it is already clear that the venture will be crowned by success.

Except on the East Coast of Sumatra and in South Acheen, the cultivation of the oil palm in the Dutch East Indies is still of slight importance. Regions with decided rainy seasons are found less suitable for this industry, since harvest time is then limited to certain periods. This exerts an adverse economic influence on the trade.

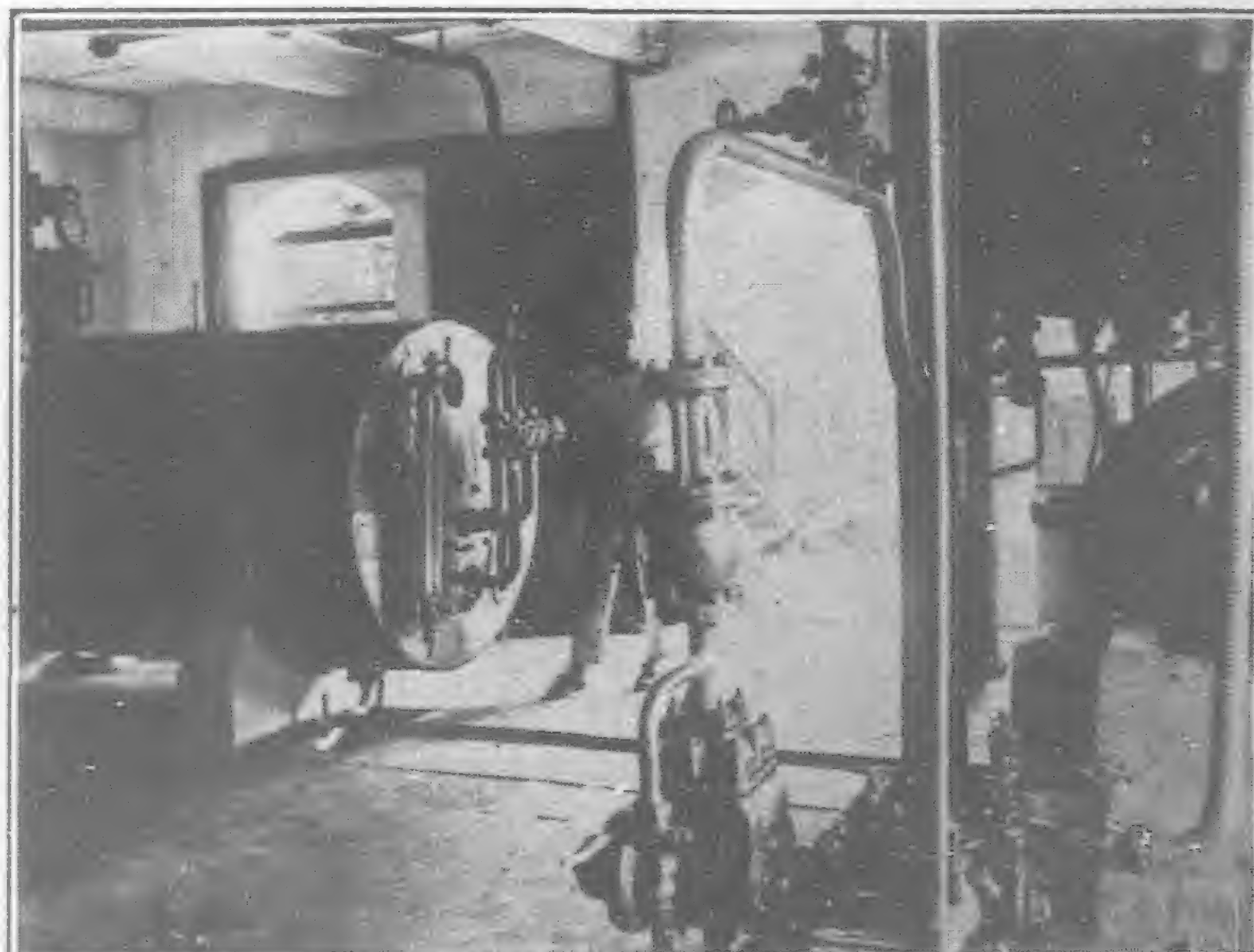
As regards soil, climate and transport facilities, the East Coast of Sumatra offers excellent conditions for oil palm growing, and it is therefore likely that it will be limited chiefly to this region, though a further extension in South Sumatra is not improbable.

The palm flourish so well in Eastern Sumatra that plantations five years old produce sufficient fruit to justify starting a factory. Most of the estates are provided with narrow gauge railways to which the fruit is carried by the harvesting gangs. These are usually Javanese coolies who work without constant supervision and cut and carry from sixty to seventy heads of fruit per man per day. Work goes on seven days a week with two holidays per month. As a result of the cheap and excellent labor, the comparatively small amount and cost of European supervision, the higher yielding palms and high percentage of oil recovered, some plantations are already producing a high quality of oil, shipped in



Avros, Medan

Installation for Extracting Palm Oil



Avros, Medan

Hydraulic Press in Palm Oil Plant



barrels and landed in Europe at an all-in cost of under 21 pounds sterling per ton.

*Progress during recent years.*—Originally very primitive small factories were built, fitted with simple apparatus, yielding a moderate return of oil with a high percentage of free fatty acid. Only in the last five to six years has the building of large modern mills been undertaken. These are naturally far more costly than the first but yield a much greater return of oil, poor in f.f.a. (28 per cent. of oil from the fruit with 2 to 3 per cent. f.f.a.). The process in the factories is, shortly, as follows:

On arrival at the factory, the heads of fruit are sterilized in big drums by steam under low pressure. The bunches are then threshed. The fruit which is not fully developed and has been left on the bunches is then discarded, whereas the sound fruit is taken to the first press. Here, after preparatory heating in a stirring bin under pressure (75 atmospheres) the bulk of the oil is expressed (usually the Krupp revolving press being used). Thereupon the whole mass goes to the depulpers where the pulp and stones are separated. The pulp then goes either to the second press where, under pressure of 450 atmospheres, it yields a further small percentage of oil, or otherwise it is brought to the extraction apparatus in which, by solution in benzine fumes, the remaining oil is extracted. Subsequently the oil is conducted to the collecting tanks and must only be clarified before it is ready for shipment. The stones go from the depulpers to the driers and thence to the crushers (centrifugal or roll crushers); the kernels and shells are then separated.

Through the experience, which is being gained by constant production, the process of oil manufacture is steadily developing.

*Packing and shipping.*—The problem of packing and despatch of palm oil has not yet been completely solved. Experiments have been made with various types of containers, namely, wooden barrels of 600 and 180 litres capacity, steel drums (in some cases collapsible), and even in kerosene tins. Of all these, the 180-litre barrels proved the most satisfactory; the cost of packing, however, remained too high, while there was often considerable leakage *en route*.

The first shipment of oil in bulk (*i.e.* without containers) left Belawan, Deli, in March 1925, and was quite successful; the increase in free fatty acid during transit being negligible. At the first attempt the loading process was very slow, only about twelve tons per hour. But, since 1926, two 500-ton tanks have been built at Belawan harbor by the "Société Financière," and it is now possible to load the oil into ocean going steamers at a rate of 60 to 70 tons per hour. The oil supply from the estates situated on the Deli railway is transported in tank trucks and on arrival at Belawan pumped into the above-mentioned tanks. (\*)

*Handicapped by Ocean voyage.*—East Indian palm oil has to suffer a longer sea journey through a hot climate than West African oil, but in practice it is found that owing to the high quality of the oil it does not in fact deteriorate appreciably, and although a considerable quantity was lost in earlier shipments through leakage from barrels, this has now been remedied through experience gained or by shipment in bulk. We have therefore to consider only differences in cost of freight and interest on goods in transit. The latter point will always be against the East, but the freight charges do not differ greatly.

*Planted area steadily advancing.*—Whereas by the end of 1918 the oil palm plantations on the East Coast of Sumatra and in South Acheen covered an area of only 10,800 acres; by the end of 1927 this surface amounted to more than 106,000 acres.

The following table drawn up from data collected by the Statistical Bureau of the Department of Agriculture illustrate the rapid development of the industry during recent years:

Year.	No. of estates submitting re-ports	Area under cultivation		Exports of palm oil (unit: tons of 1,000 Kilos).
		Total.	Producing	
1922	62	40,200	9,400	3,800
1923	58	45,600	11,300	4,100
1924	59	58,400	12,300	5,200
1925	61	76,500	24,000	7,100
1926	52	71,300	27,100	13,300
1927	54	106,917	39,572	21,600

It is deserving notice that the returns in the second, third and fourth column are not complete; among others the figures of

\*The total capacity of the plant has been fixed at three tanks of 800 and two tanks of 500 tons.

the extensive plantations of the "Handelsvereeniging Amsterdam" (Amsterdam Trade Association) are not included. This explains *f.i.* the apparent decrease in the number of estates during the years 1926 and 1927.

*Exports.*—The export of palm oil increased from 578 tons in 1919 to about 21,600 tons in 1927. Shipments during the last three years had the following destinations:

DESTINATIONS:		1925.	1926.	1927.	1928.
		Tons.	Tons.	Tons. (9months)	
U. S. America	.. ..	2,384	5,484	9,112	10,468
Holland	.. ..	1,596	3,918	8,033	4,111
Great Britain	.. ..	1,286	2,368	3,623	2,253
Germany	.. ..	1,355	1,047	115	1,200
Japan	.. ..	271	102	101	214
All other	.. ..	184	364	632	453
Total	.. ..	7,076	13,283	21,616	18,699

These statistics show, among other things, that exports to the U.S.A. are remarkably increasing. This increase coincides with the introduction of the shipping of the oil in bulk. Exports both to Holland (probably chiefly destined for Germany) and England have also progressed notably.

The above-mentioned returns offer every reason to expect that exports in the next few years will once more materially increase. For 1931 it is estimated that shipments will be as large as 30,000 to 40,000 tons, a quantity which represents a handsome share in the World's supply of approximately 190,000 long tons.

## The New Ford Plant at Yokohama

(Continued from page 138).

On the north side of the building, a railway siding has been built and a canal to the sea bounds the site on the west and the bay on the south. Incoming shipments at present are transported up the canal in lighters and landed in the bonded warehouse by a crane which runs along the dock. Among the mechanical installations are the boiler rooms which include all accessory equipment and furnish steam for heating and manufacturing purposes. The equipment includes smokeless, automatic stokers and all coal and ashes are handled by a conveyor system.

The plant is heated by steam, the offices being warmed by steam radiators and the rest of the plant by the unit or blast heater system. A special transformer house has been provided for the transformers which handle the electric current supplied for lighting and power purposes.

The plant is protected from fire by a complete sprinkler system with sprinklers installed above and below the office ceilings. The system is of the dual type and can be operated from the water tank or from the city water pressure.

While the quake-devastated Keihin district was still fighting an uphill battle toward reconstruction the Ford Motor Company of Japan, Ltd. came into being and immediately thereafter introduced the first automobile assembly plant to the Orient. Officials of the Ford Motor Company at Detroit had been studying the economic situation in the Far East for a long time when they decided in the Summer of 1924 to take definite action. By February, 1925, the Ford Motor Company of Japan was fully organized with a paid-up capital of Y.4,000,000, according to the "Japan Advertiser."

Finding quarters for the new institution was the first problem which the company had to meet, and at that time it was a problem of no mean proportions since the great earthquake was a matter of history by only 18 months. But matters were arranged and with the co-operation of the Yokohama Dock Company the first assembly plant was installed in temporary structures of galvanized iron at Midoricho 4, Yokohama, in the month of March, 1925.

The entire site of the new plant occupied 2,500 tsubo, 1,100 tsubo of which was represented by the buildings. The site was less than a third the size of that occupied by the new plant and the area under roof about one fourth. The factory was small but it was decidedly important because it marked a definite step in the history of the automobile industry in Japan.



# Engineering Notes

## ELECTRIC LIGHT, POWER AND TRACTION

**UJIGAWA DENKI K.K.** (Ujigawa Electric Power Co., Ltd.).—The Omine Power Plant of the Ujigawa Denki K.K., capacity 20,000 k.w. (two units of 10,000 k.w. each), has been equipped with automatic operating devices, and it is reported to be the largest automatic power station so far constructed in Japan. The use of this device is gradually increasing, as a means of saving expenses and improving efficiency.

**DAIDO DENRYOKU K.K.** (Great Consolidated Electric Power Co., Ltd.).—In order to avoid excessive dependence on steam power, as is the case in Osaka at present, the company is planning to construct a big reservoir on the Kiso River to ensure water power resources and increase generating capacity at the Kiso River power plants. On the site selected near the Imperial Forests at Miura, in Nagano Prefecture, a reservoir with 4,000 million cubic feet capacity will be constructed at an estimated cost of Y.2,000,000. The plan has been unofficially approved by the Imperial Household Department. When all power plants on the Kiso River are completed, the total generating capacity will be 370,000 k.w.

**TENRYUGAWA DENRYOKU K.K.** (Tenryugawa Electric Power Co., Ltd.).—The Minami-muki Hydro-Electric Power Station, capacity 25,000 k.w., has just been completed and passed government inspection and operation has been started. The construction was begun in July, 1926.

**SHANGHAI ELECTRICITY.**—Tenders for the proposed purchase of the Shanghai Municipal Electricity Department have been submitted. The three groups who submitted tenders to the Electricity Special Committee (1929) based upon the above Memorandum of Franchise were:—The Hon. R. D. Denman; British Trusts Association Ltd.; and the American and Foreign Power Company, Inc. The tenders were opened by the Chairman of the Council in the presence of the representatives of the tenderers and the Electricity Special Committee.

The following offers were made:—  
First: The Hon. R. D. Denman's offer for leasing:—

In brief the scheme is that a S. M. E. Company lease the undertaking on terms of paying for the interest and Sinking Fund Instalments on all the Council's Electricity Loans plus a fixed rent of Tls. 2,000,000 per annum. After the payment of a 9 per cent. dividend on the Company's ordinary shares, three-quarters of the surplus profits go to the Council and one-quarter to the Company. A sliding scale of benefits to consumers is included, which operates after 10 per cent. is paid, not on the whole capital of the Company, but on the ordinary shares only.  
Second: British Trusts Association Ltd:

Offer (A): Fifty-one million Taels—under the terms and conditions of the Memorandum of Franchise.  
Offer (B): £7,200,000. Sterling.—Conditional upon certain amendments to paragraphs 8 and 13 of the Committee's Memorandum of Franchise.

Offer (C): An offer to lease on terms to be mutually agreed upon.  
Third: American and Foreign Power Company, Ltd. Inc.

Eighty-one million Taels—under the terms and conditions of the Memorandum of Franchise.

These offers will be taken under consideration by the Electricity Special Committee who will make their recommendations thereon to the Council.

**KEIHANSHIN KOSOKUDO DENKI TETSUDQ.**—A new high speed electric railway is being planned between Kyoto and Kobe via Osaka. The line is to start from 4-chome, Nunobiki, Kobe, pass near Osaka Station (Government Line) and along the southern coast of Yodo River and terminate at Higashi Shiokoji, Kyoto. The Kobe-Osaka section is to be covered in 25 minutes, between Osaka and Kyoto in 35 minutes. The total capital is estimated at Y.70,000,000.

**POWER CONTRACT WITH TOKYO MUNICIPAL ELECTRIC BUREAU.**—A power contract just signed is for 5,000 k.w., maximum 37,000 k.w. The rate of charges is stipulated at 2.28 sen per k.w.h.; load factor 55 per cent.; delivery to be made at Shibuya substation, and Konuma Substation. The contract is to be in force from April 1, 1929, to March 31, 1930. Nippon Denryoku must construct a new power transmission line from Kawasaki Substation to Tokyo Municipal substation at Shibuya, at a cost of some Y.1,000,000, and supply will be started around October this year, it is reported.

The 5,000 k.w. given in the contract is for a natural increase of supply, while the maximum of 37,000 k.w. is to provide for emergency that may happen with Kinugawa Denryoku's power supply of the same amount.

**TSUKUBA KOSOKUDO DENKI TETSU-DO K.K.** (Tsukuba High Speed Electric Railway Co., Ltd.).—The plan of this company to build an underground railway from Nippori to Ueno, Tokyo, has been licensed by the Department of Railways. The distance of the route is one mile 30 chains from the projected Nippori Station to below Saigo's Statue in the Ueno Park, near the Ueno Station. The cost of construction for this underground section is estimated at Y.4,000,000. The company is now carrying on construction between Nippori and Senju, near Tokyo.

**UJIGAWA DENKI K.K.** (Ujigawa Electric Power Co., Ltd.).—Ujigawa Denki K.K. is now operating an electric railway between Kobe and Himeji (formerly known as Kobe-Himeji Denki Tetsudo). The company is planning to establish a new company to take over the property and to extend the present line as far as Okayama City, in Okayama Prefecture, for 52 miles.

This cost of construction for extensions is estimated at about Y.5,000,000 and the line is to start from Shikama, and passing through Aboshi, Akaho, Hibu, Katagomi, Kato, Saiaiji, Hirai, Asahikawa and Daigen, will run along the Uno Line of the Government Railway to Okayama. The gauge will be 4-ft. 8½-in.

The new concern is to be known as the Sanyo Denki Tetsudo K.K., and is to be capitalized at Y.20,000,000.

**STATISTICS ABOUT THE MANCHURIAN RAILWAYS.**—According to a recent report, the total length of the 16 railways in Manchuria is 35,448 miles. The following is a table giving the name, length and the main stations of each of the railways:

Name of the Railway	Length	Main Stations
The Chinese Eastern Railway ..	Main line : 924.7 miles Branches : 148.2 "	Harbin, Kwanchengtze.
Peiping-Mukden Railway ..	Main line : 521.9 " Branches : 202.2 "	Peiping, Mukden, Kobangtze, and Yingko.
Ssupingkai-Taonan Railway ..	Main line : 185.5 " Branches : 74.0 "	Ssupingkai, Taonan, Chengkatung and Tungliao.
Kirin-Changchun Railway ..	Main line : 77.9 "	Kirin and Changchun.
Taonan-Anganki Railway ..	Main line : 142.9 "	Taonan and Anganki.
Mukden-Hailung Railway ..	Main line : 145.7 "	Mukden and Hailung.
Huma-Hailun Railway ..	Main line : 69.6 "	Sungpu and Hailun.
Tungyu Railway ..	Main line : 18.0 "	Nuermiao and Dayaoko.
Moking Railway ..	Main line : 37.0 "	Shachengtze and Lishihcheng.
Holikang Railway ..	Main line : 35.0 "	Lienhuapao and Holikang.
Kicheng Railway ..	Main line : 9.0 "	Bengkihu and Newsingdai.
Kaitoh Railway ..	Main line : 39.7 "	Kaiyuan and Sifeng.
Tientu Railway ..	Main line : 62.8 "	Difang and Toudaoko.
Tsitsihar-Anganki Railway ..	Main line : 18.0 "	Tsitsihar and Anganki.
South Manchurian Railway ..	Main line : 438.5 " Branches : 161.7 "	Chungchun, Dairen, Antung and Sukateng.
Kingfok Railway ..	Main line : 63.4 "	Kingchow, Chengtsetung and Bitzewo.

## RAILWAYS

**JAPANESE DEPARTMENT OF RAILWAYS TO BUY PRIVATE LINES.**—The purchase of private railways has been decided by the conference of high railway officials, as follows:

Hinokami Tetsudo, Anan Tetsudo, Uwajima Tetsudo, Hakatawan Tetsudo, Hokkaido Tetsudo, Iwate, Keiben Tetsudo, Kamaishi Kozan Tetsudo, Shinano Tetsudo, Ikeda Tetsudo, Chugoku Tetsudo, Ryobi Tetsudo, Geibi Tetsudo.

Also the Department has decided to give compensation to the following three railways. Arita Tetsudo, Chikugo Kido, and Yamaguchi Prefectural Railway.

Budgets for the above are estimated at Y.50,000,000, for which bonds are to be issued, if the plan is approved by the Diet. Such a large purchase and compensation, covering as many as 17 lines, is unknown in the history of railway administration in Japan.

**NEW BRANCH TO KIRIN-HAILUNG-CHENG LINE.**—The surveys for the new branch line of the Kirin-Hailungcheng Line under construction, that starts from Yentungshan south to Mengkiang via Kuankai (the Prefectural seat of Huatien) and negotiating the Nachenghung range, eventually to be extended to Linkiang (Maoerhshan) on the Korean frontiers, having been finished for most part, earthwork is to be begun on the return of the thaw. The first stage section runs from Yentungshan to Huatien (Kuankai), and the second stage section from Kuankai to Mengkiang.

**NIPPON DENKI TETSUDO K.K.**—(Japan Electric Railway Co., Ltd.)

License for the projected line between Tokyo and Osaka has been applied for by promoters including Mr. Nezu, Baron Go and 300 other business men in Tokyo and Osaka. The outline of the plan is as follows:

The new company is to be capitalized at Y.250,000,000, and the construction is to be completed in five years. The distance of 298 miles between the two cities is to be covered in 6 hours or at a speed of 50 miles an hour. The gauge will be 4' 8½".

Stations will be erected at: Shibuya Machi, starting point in Tokyo; Nishi Yokohama, (Kanagawa Pref.), Gotemba Machi (Shidzuoka Pref.), Shidzuoka City, Kita Hamamatsu (Shidzuoka Pref.), Okazaki City (Aichi Pref.), Nagoya City (Aichi Pref.), Kameyama Machi (Miye Pref.), Kita Nara (Kyoto Pref.), Noye Machi, Higashi Nari Ku, (Osaka) terminus.

Income is estimated at three sen a mile or Y.53,061,199 for passengers, miscellaneous Y.2,653,060, total Y.55,714,259. Expenditure is estimated at a total of 25,628,554, which leaves a balance of profit Y.30,000,000 or about 12 per cent. of the construction costs.



**SHIMA DENKI TETSUDO K.K.** (Shima Electric Railway Co., Ltd.).—The construction of this railway in Miye Prefecture has been progressing well, so that the opening of the line is now expected in May, probably on the first of the month. The line starts from Toba, in Miye Prefecture, and passing through Shima Province, terminates at Kashikojima Island, distance 16 miles. This is an islet, located near Jinmei, and is reached by a steel bridge.

**NORTHWESTERN RAILWAY PLANNED.**—A memorandum pointing out the advisability of a light railway between Pingtichuan, in northern Shansi, and Urga, in Outer Mongolia, to facilitate communication along the border has been jointly submitted by General Yen Hsi-shan and Mr. Chao Tai-wen, Minister of Interior, to the Central Political Council. The memorandum recommends that inasmuch as the proposed line will have a direct bearing on the border defence of the country, the Ministry of Railways be instructed to plan for its early construction.

**NEW BRANCH TO KIRIN-HAILUNG-CHENG LINE.**—The surveys for the new branch line of the Kirin-Hailungcheng Line under construction, that starts from Yentungshan south to Mengkiang via Kwankai (the Prefectural seat of Huatien) and negotiating the Nachenghung range, eventually to be extended to Linkiang (Maoerhsan) on the Korean frontiers, having been finished for most part, earthwork is to be begun on the return of the thaw. The first stage section runs from Yentungshan to Huatien (Kuankai), and the second stage section from Kuankai to Mengkiang.

## INDUSTRIAL

**TOKUYAMA PARAPHIN PLANT.**—The South Manchuria Railway Company is planning to establish a new subsidiary to operate the oil refinery at Tokuyama recently bought from Asahi Sekiyu K.K. The plant will be improved to manufacture paraffin, probably about 6,600 tons during the first year. The construction is expected to be completed before the end of this year. The new company will be capitalized at Y.2,000,000, and S.M.R. will accommodate an additional Y.1,300,000, making the total capital Y.3,300,000.

**FUKUI BOSEKI K.K.** (Fukui Spinning Co., Ltd.).—The construction of the mill of Fukui Boseki K.K. was completed before the end of last year, and a trial run was made on February 3. The first part of instalment comprising of 5,000 spindles will be completed before the end of April this year, and the equipment will be increased to 90,000 spindles and 1,000 looms in the future. Capital, Y.3,000,000; this is a subsidiary of Kinka Boseki K.K.

**NEW CANTON CEMENT PLANT.**—The Kuangtung Provincial Government has contracted with F. L. Smidth & Company of Copenhagen, for a new cement plant in the North River District with a capacity of 1,200 barrels per day. The plant will be situated near Ying-tak. Mr. T. Stig-Nielsen, represented the F. E. Smidth Company.

**SODIUM PEROXIDE IN JAPAN.**—There are three companies in Japan engaged in the manufacture of sodium peroxide: the Nipon Soda K.K., the Hodogaya Soda K.K., and the Toyo Soda K.K. The two latter are associated companies and have factories at Hodogaya, just outside Yokohama. The daily production of the Nipon Soda K.K. is stated to be 5,000 pounds, and that of the other two companies combined, 6,000 pounds. The two Hodogaya companies purchase their supply of caustic soda from British sources. The source of supply for the Nihon Soda Co. is unknown. The Japanese sodium peroxide is packed in 10-pound tins, ten tins to a wooden case. It is reported that the production of the three firms mentioned above, supplies the demand for sodium peroxide for domestic consumption.

**NORTH SAGHALIEN PETROLEUM CO., LTD.**—Success is reported of a new well in eastern coast oil fields, known as "Katanguri" (phonetic). The well produced oil at a depth of 88 meters. At present the Oha Fields are producing about 2,500 koku a day, and the success in new fields is said as indicating the richness of oil deposits in North Saghalien.

**PLANS OF THE NEW AMMONIUM SULPHATE COMPANY.**—Capital of the new company planned by Tokyo Dento, Toshin Denki, Daido Denryoku, Toho Denryoku and South Manchuria Railway Company, to manufacture sulphate of ammonia, will be Y.45,000,000, of which S.M.R. will bear Y.15,000,000.

Fixation processes to be adopted by the new concern will be those of Ude (?) and Fafler (??), for which a provisional contract has been closed at Y.1,500,000, by representatives sent abroad—Mr. Takahashi, managing director of Toshin Denki, Mr. Yokoyama and Mr. Kagiwada, both engineers. The necessary machinery are to be made by Mitsubishi Works at Kobe and the Kure Naval Engineering Works. The construction of the factory is to be completed before the end of 1931, and the productive capacity is rated at 100,000 tons in Japan and 100,000 tons in Manchuria. Concrete plans will be decided at a meeting of promoters to be called about the end of February.

**OIL FIELDS IN KARAFUTO.**—A contract has been signed between the Karafuto Government and the Nippon Sekiyu K.K. (Japan Petroleum Co., Ltd.) for prospecting oil fields there. The contract is good for five years from 1929 onward. Oil fields to be prospected include: Two plots owned by the company and three plots applied for prospecting in Honto Gun; five in Ochiai Gun, five in Kushunnai Gun. Five wells are to be drilled in five years in the area agreed upon.

In case of production, the company is to pay the Karafuto Government an equivalent for 3 per cent. of oil produced, estimated at current price. The depth of prospecting is required to be 1,100 meters. The Government of Karafuto is to grant a subsidy of Y.64,000 a year or a total of Y.320,000 in five years.

## SHIPPING AND SHIPBUILDING

**NEW MOTOR VESSEL LAUNCHED FOR YANGTZE MAIL LINE.**—The M.V. *I Fung* owned by the Yangtze Mail Line Inc., was successfully launched from the slipway of the New Engineering and Shipbuilding Works at Yangtze-poo recently.

The *I Fung* was built to the order of the Chien Hsin Engineering Co. by the New Engineering and Shipbuilding Works for the Yangtze Mail Line Inc. for service in the Middle Yangtze. It is the first vessel of its size and capacity with full Diesel engines to operate on the Middle Yangtze. It is a splendid looking vessel and when completed for service will mark another step forward in Yangtze shipping.

**NEW O.S.K. VESSELS.**—The *Midori-maru* and the *Sumire-maru*, excellently equipped Diesel engine boats of 1,700 tons, were recently put in service by the Osaka Shosen Kaisha for its Osaka-Beppu Line, which passes through the world-famous maritime scenery of the Inland Sea.

The company now operates a service twice daily with the new additions, and the *Murasaki-maru* and the *Kurenai-maru*, both fine pleasure boats that formerly queened it in the Inland Sea.

The new sister boats, the construction of which was based on practical experience derived from older boats, are accommodated with every modern comfort.

All the first class cabins, decorated with refined taste, are located on the promenade deck and are provided with verandahs.

The new steamers, leaving the terminal ports at night, afford a wonderful daylight trip through the most picturesque part of the Inland Sea.

**NEW JAPANESE CARGO VESSELS.**—The Yamashita Kisen Kaisha, which already has a 9,000-ton M.A.N. cargo ship on order with the Uraga Dockyard, will shortly order three more Diesel-engined ships, each of 10,000 tons deadweight. The order will probably go either to the Yokohama Dockyard, the Uraga Dockyard or the Mitsubishi Yard.

**NEW JAPANESE SHIPOWNERS.**—A new shipping company, named the Showa Kisen Kaisha, has placed an order for a motor ship which will be the first vessel of its fleet. It is to be called the *Kowa Maru* and will be 415-ft. long, with a beam of 56-ft. and a depth of 31.9-ft. The gross tonnage will be 5,800 and the deadweight capacity 9,800 tons. It will be equipped with M.A.N. machinery.

**O.S.K. PLANS EXPANSION PROGRAM.**—The Osaka Shosen Kaisha has announced an extensive shipbuilding program involving 11 freight and passenger boats with an aggregate tonnage of 67,900 in competition with the Nippon Yusen Kaisha. The total shipbuilding cost is estimated at about Y.22,000,000.

According to the plan, the company will build four diesel-engined freighters, each of 8,000 tons gross, for its New York cargo service. The construction expenses are estimated at about Y. 8,000,000 for all. The company will invite shipbuilders for tenders within this month.

Three freighters of 5,300 tons, each equipped with cold storage systems, will be built by the company for Y.4,000,000. These ships are expected to be completed in March next year.

Two steamers each on the company's South American and Australian services also will be constructed for a total cost of about Y.10,000,000. These ships are intended for the transportation of emigrants, and are expected to be finished before June of next year.

**BRITISH ENGINES IN INDO-CHINA.**—J. W. Brooke & Co., Ltd., of Lowestoft, despatched a number of their well-known marine engines to this district during 1928, ranging up to 28 h.p., the latest being one of their new model "Empire" four-cylinder engines for installation in a launch building at Saigon.

**AMERICAN VESSEL BUILT IN HONGKONG.**—A vessel built by a local firm of shipbuilders figures among the departures from the port to-day. This is the s.s. *Naga*, built by the Hongkong and Whampoa Dock Co., Ltd., for the Manila Railroad Company of the Philippine Islands.

Launched in January, the s.s. *Naga* is a vessel of 369 nett tonnage while her dimensions are: Length 160 feet, beam 35 feet and depth 13.6 feet. She is leaving Hongkong for Manila in ballast under the command of Capt. Alfreda Suabitta and flies the American flag.

It is understood that the owners intend putting her on a run along the east coast of the Philippines to connect two portions of their railroad but no particulars are yet available.

## PUBLIC WORKS

**BRIDGE PROJECT IN KEDIRI, JAVA.**—Tenders will shortly be invited for the construction of a bridge 380 meters in length across the Kali Brantas River, south of the town of Kediri, Java, according to Trade Commissioner Thomas C. Barringer, Batavia. Tenders will also be invited for the erection of residences on the Koemir sugar plantation. Both these tenders will be executed for the account of the "Handelsvereniging Amsterdam," 162 Voorburgwal, Amsterdam, Netherlands, and the costs are estimated at several millions of guilders (par value of guilder is \$0.402).



**P. 1,000,000 DRY DOCK IN ILOILO.**—A million peso dry dock, the first of its kind to operate in Southern ports will very soon be built by the Visayan Stevedoring and Transportation Company in La Paz, Iloilo.

The Public Service Commission, in authorizing the Visayan Stevedoring Company to build a dry dock in Iloilo, recognizes the necessity of a place where small steamers can be repaired or overhauled without the necessity of making trips to Manila for such work on the damaged vessel.

The petition of the Visayan Stevedoring to operate a dry dock in Iloilo met the approval of the shipping concerns in the Visayan Islands and was also favorably indorsed by the captains of the interisland steamers plying in the southern ports.

According to investigations made by the commission, there are many small vessels operating between Visayas and Mindanao and ferry boats along the coast of the Visayan Islands that need constant repairs.

Last year, a total number of approximately 40 boats operating in the southern ports were taken to Manila for repairs. Most of the damages suffered by those boats could have been repaired in those places had there been any kind of dry dock, it was explained.

It is believed that with the operation of a dry dock in Iloilo, the service of coastwise shipping will be greatly improved. In most of the cases when a small boat leaves behind schedule time, the reason given to the commission for such delay has always something to do with the condition of the boat, Judge Cruz declared.

The Visayan Stevedoring and Transportation Company plans to start the dry dock in La Paz, Iloilo with a capital of approximately P. 1,000,000.

## TELEPHONE, TELEGRAPH AND RADIO

**NEW LONG-DISTANCE TELEPHONE LINE.**—An inter-provincial telephone service for Kwangtung and Kwangsi is under the joint consideration of the two Provincial Government Committees. The three lines to be first started are the Sikiang-Wuchow, Yinlien-Nanning, and Lienshan-Kweitao Lines which will be extended to link up with other cities from time to time. A survey of the lines is now being made by engineers.

**AUTOMATIC TELEPHONES IN CHINA.**—The Siemens-China Company, has received an order for an automatic telephone exchange of the Strowger system. The order was given by Macao for an exchange of 1,000 subscribers and the contract was signed between the Governor of Macao and Siemens China Co.

The Siemens China Co. has erected in China the following automatic exchanges of the Siemens Strowger system with a total capacity of about 16,000 subscribers.

Tientsin, three exchanges with a capacity of 9,000 subscribers.

Fudsiadin (Harbin), one exchange of 1,500 subscribers.

Harbin, one exchange of 100 subscribers.

Mukden (Jap. Conc.), one exchange of 4,000 subscribers.

Mukden (Arsenal), one exchanges of 200 subscribers.

Macao, one exchange of 1,000 subscribers.

In Japan Siemens has erected large exchanges at Yokohama, Kobe, Nagasaki and other places with a total capacity of more than 30,000 subscribers.

**WIRELESS INSTALLATION FOR SINGAPORE HOSPITAL.**—An up-to-date wireless receiving set has been supplied by the Marconiphone Company, Limited, 210-212, Tottenham Court Road, London, W.1, for installation at Mount Lavinia Hospital, near Singapore. The equipment, which is of all-British construction, is capable of operating ten loud speakers and a number of headphones. On account of the humid atmosphere at Singapore, special provision has

been made to render the apparatus immune from leakage, and a panel of unusual design has therefore been used, mounted on a strong angle-iron framework, which also carries the switches and other apparatus for charging the high and low tension accumulators.

## ROADS

**KYOTO-OSAKA HIGHWAY.**—The draft plan of improving the Osaka-Kyoto inter-prefectural road made by the experts of the Osaka-Prefecture since last year, as far as its share was concerned, was approved by the authorities of the prefecture. In order to secure the approval of the Home Office of the Imperial Government, Mr. Kato, Chief of the Legislative Section of the prefectural government, by order of Governor Chikaraishi, left Osaka on the night of January 16 for Tokyo.

According to the draft plan, the present second grade national road, that is the line from, Osaka *via* Noe, Moriguchi and Hirakata, Osaka Prefecture, along the east bank of the Yodogawa, will be designated as a motorcar road. Another road will be built along the west bank of the river, that is, from Osaka *via* Suita, Ibaraki, Takatsuki, Tomita and Yamazaki to connect with the Kyoto Prefecture section of the road, with a width of 60 feet. It will be made into a first rate industrial road and a proper pavement made, in order to assist in the development of the districts through which the road passes.

The total cost of the work is estimated at Y.16,000,000. Out of this total Y.10,000,000, after the already appropriated amount is deducted, is to be secured by a national subsidy as well as additional rates levied upon those who will be benefited by the improvement.

**HONAN-SHENSI ROAD OPENED.**—The Inter-provincial motor highway connecting Lingpao, in Honan, with Tungkwan, in Shensi, was formally opened to traffic recently. Chairman Sung Chieh-yuan of the Kansu Provincial Government, Minister of Public Health Hsueh Tuh-pi, and representatives from General Feng Yuxiang and the Minister of Railways were among the officials present at the ceremony. A number of omnibuses are now operating on the new motor road.

**HIGHWAY BUILDING IN CHEKIANG.**—The Reconstruction Department of the Provincial Government of Chekiang plans to build 10 new highways in the province. They are: (1) Hangchow to Changhing, (2) Hangchow to Pinghu, (3) Hangchow to Changhua, (4) Singcheng to Wenchow, (5) Singcheng to Ningpo, (6) Tunglu to Chuchow, (7) Chuchow to Changshan, (8) Chuchow to Kiangshan, (9) Yungkang to Wenchow, and (10) Yungkang to Lisui. Construction expenses to be met by a loan of \$2,500,000, of which, according to a recent report \$405,470.04 already has been collected.

**NANCHANG-LIENTANG HIGHWAY COMPLETED.**—The Nanchang-Lientang portion, 30 li long, of the Kiangsi-Kwangtung Highway, which is one of the six projected main highways of Kiangsi, has been completed, and four buses shipped from Shanghai to Nanchang for services on the line. The portion from Lientang to Fungcheng is reported nearing completion.

## AVIATION

**COMMERCIAL AIR SERVICES IN MANCHURIA.**—The Three Eastern Provinces will have a commercial air service of their own. According to the plans of their Political Affairs Committee, a commercial company with a capital of two million dollars will be organized. Fifteen aeroplanes will be used to maintain a mail,

passenger and freight service between the chief cities in Manchuria. Arrangements will also be made for rapid transportation of mail bags from and to China *via* the Trans-Siberian Railway.

**ABOUT SHANGHAI-HANKOW-PEIPING COMMERCIAL AIR SERVICE.**—The Ministry of Communications is hastening preparations for the inauguration of a Shanghai-Hankow-Peiping commercial air service in the near future. Several aviation experts have been sent to inspect the Lunghua Aerodrome and the aviation field in Woosung and to ascertain the feasibility of opening a permanent aviation station at one of the two places.

**CHINESE AIR MAIL LINES.**—The Aeronautics Department of the Ministry of Communications has drawn up a comprehensive plan divided into five projects for the early establishment of air mail lines throughout the country. Following is a brief account giving the proposed routes with some of the main stations in each of the five projects. Details as to financing these projects are to be made public shortly.

I. The first project is to combine the Nanking-Shanghai section of the Nanking-Kwangsi Air Line and the Nanking-Chengtou section of the Nanking-Tibet Line into a direct route from Shanghai to Chengtu.

II. The lines to be established under the second project are as follows: (1) To combine the section from Kaifeng to Lanchow and the section from Kaifeng to Tsingtao into a direct line from Tsingtao to Lanchow. This line will be divided into two sections with Kaifeng as the dividing station and airplanes will stop at Tsinan and Sian. (2) To combine the section from Nanking to Canton of the Nanking-Kwangsi Line and the section from Nanking to Mukden of the Nanking-Heilungkiang Line into a direct line from Canton to Mukden. This line will be divided into four sections with Foochow, Shanghai and Peiping as the dividing stations, and the airplanes will stop at Swatow, Hangchow, Tsingtao, Tientsin and Jehol.

III. The lines to be established under the third project are as follows: (1) The Canton-Peiping Line.—This line will be divided into two sections with Hankow as the dividing station, and airplanes will stop at Shuichow, Changsha, Kaifeng and Shikiachwang. (2) The Nanking-Yunnan Line.—This line will be divided into two sections with Changsha as the dividing station, and the airplanes will stop at Nanking, Hungkiang and Kweiyang. (3) To combine the northern section of the Nanking-Heilungkiang Line and the section from Heilungkiang to Urga into a direct line from Mukden to Urga. This line is divided into two sections with Heilungkiang as the dividing station, and airplanes will stop at Kirin, Harbin, Kolulun and Tsechen.

IV. The lines to be established under the fourth series are as follows: (1) To complete the Canton-Nanking section of the Nanking-Kwangsi Line. (2) The Nanking-Ninghsia Line.—This line will be divided into two sections with Taiyuan as the dividing station, and airplanes will stop at Tsinan, Kweisui and Paotou. (3) To complete the section from Lanchow to Tihwa of the Nanking-Sinkiang Line. This line will be divided into three sections with Suchow and Hami as the dividing stations, and airplanes will stop at Sian and Turfan. (4) To complete the section from Chengtu to Lhasa of the Nanking-Tibet Line. This line will be divided into two sections with Chamdo as the dividing station, and airplanes will stop at Tatsienlu and Kiali.

V. The main work under the fifth project is to complete all the other unestablished lines in the country. No mention, however, is made of international lines. The routes are as follows: (1) The northern extension of the Nanking-Sinkiang Line from Tihwa to the Tien Shan Mountain of Ili *via* Wusu. (2) The extension of the Nanking-Tibet Line from Lhasa to Kotak *via* Chalunpusak. (3) The southern extension of the Nanking-Sinkiang Line from Turfan to the Tien Shan Mountain of Kashgar *via* Yenki, and Aksu. (4) The northern extension line from Urga to Ili *via* West Urga, Uliassutai, Kobdo, Chenghwa, and Kalpahatai.



**AIR LINE TO DAIREN.**—Passenger air service between Tokyo and Dairen will be opened in April by the Nihon Koku Yoso Kaisha, which received a Government subsidy of ¥20,000,000 for the purpose last year.

Since the company has the privilege of using already established landing fields throughout the country and in leased territories abroad, the only preparations necessary are the building of exclusive hangars at fields on the route. Those at Tachikawa, Osaka, Fukuoka, Keijo and Dairen are expected to be finished by the end of March. The company has purchased six planes each from America and Holland, and they are expected there in the near future.

## MINING

**MINING IN CHINA.**—In his latest report to the Department of Overseas Trade, published by H.M. Stationery Office, price 2s. 6d. net, Mr. H. H. Fox, C.M.G., Commercial Counsellor, British Legation, Peking, refers to mining industries in China. He points out that China's coal mines have, with few exceptions, suffered more from civil war and interruption of communications than any other industries, and that though in most cases no statistics are available it may safely be estimated that the production of coal is now less than one-half of what it was in 1925, namely, 25,000,000 tons. The two fortunate exceptions are the Fushun collieries in South Manchuria operated by the South Manchuria Railway, and the Kaiping mines of the Kailan Mining Administration in Northern Chihli.

It is sometimes asked why China imports some 2,000,000 tons of coal annually, principally from Japan, and exports about the same amount to Japan and Korea. The explanation is that the geographical situation of the Japanese in Kyushu enables the majority of the collieries in this field

to dispose of a percentage of their output in Central and South China at remunerative prices, whereas the mines in North China and Manchuria find it profitable to sell coal to Japan for steam raising and domestic purposes. Certain grades of Chinese coal, moreover, have special qualities such as Kaiping coal, which is very suitable for coking, and anthracite, used for briquetting and mixing purposes generally.

In regard to China's iron-ore and pig-iron, the bulk comes mainly from the Penhsihu mines in Manchuria and the Tayeh mines on the Yangtze, and it is taken by Japan. The export figures for 1927 were, ore 493,964 tons, and pig-iron 200,912 tons. Of antimony regulus China in 1927 exported 15,556 tons, about one-half going to America and the remainder to Great Britain, France and Japan. China's output of tin (in ingots and slabs), 90 per cent. of which comes from the Kochiu mines, is taken entirely by Hong Kong, whence it is shipped to the United States, Great Britain and Europe. The total export for 1927 was 6,220 tons.

**INCREASED OUTPUT OF FUSHUN COLLIERY IN 1929 PLANNED.**—The production of the Fushun colliery will be considerably increased in the coming year. While last year's output amounted to about 6,800,000 tons, this year's is estimated at 8,100,000 tons. For the transportation of this increased output a number of new railway-cars of large capacity have been added to the rolling stock, and new coal-wharves have been constructed at Dairen, Yingkow, and Port Arthur, capable of handling respectively 3,000,000, 600,000 and 800,000 tons. Both the domestic consumption of Manchuria and the export-quota are constantly growing; local sales amount to 1,800,000 tons (of which Mukden city alone consumes nearly 500,000 tons), and the South Manchuria Railway Company's own consumption, bunkers, and exports to Korea amount to close upon 2,500,000 tons. The Coal Dealers' Federation of Japan has agreed to take 1,950,000

tons, while about 1,500,000 tons are to be shipped to other parts of China and abroad.

## MACHINERY

**HEAVY DUTY SWITCH AND PLUG.**—Messrs A. Reyrolle and Company, Limited, of Hebburn-on-Tyne have recently increased their range of low tension heavy duty combined switches and plugs to include a 250-ampere size. This has been introduced primarily for use on wharves and dock sides, where supplies are required for cranes, capstans, winches, etc. The equipment comprises three main parts, namely, the cable junction box, the brush contact air-break switch, and the 250-ampere plug and socket.

In the arrangement provision has been made for "teeing" the supply off a main supply cable running the full length of the quay, the switches and plugs being mounted in underground manholes at several points.

The switch and plug are mechanically interlocked to prevent the plug being withdrawn when the switch is closed, or the switch being closed with the plug withdrawn. The lid of the switch-box is also interlocked with the operating mechanism to prevent it being opened when the feeder circuit is alive. Earthing facilities are provided right through to the plant controlled, and the whole construction is watertight. If required, combined switches and fuses may be fitted in order to protect the outgoing circuit.

**ELECTRIC WELDING PLANT FOR CHINA.**—The Equipment and Engineering Company, Limited, 2 Norfolk Street, London, W.C. 2, has received an order from the Peking-Mukden Railway Company for a complete electric arc-welding plant of that "E.L. 1" type.

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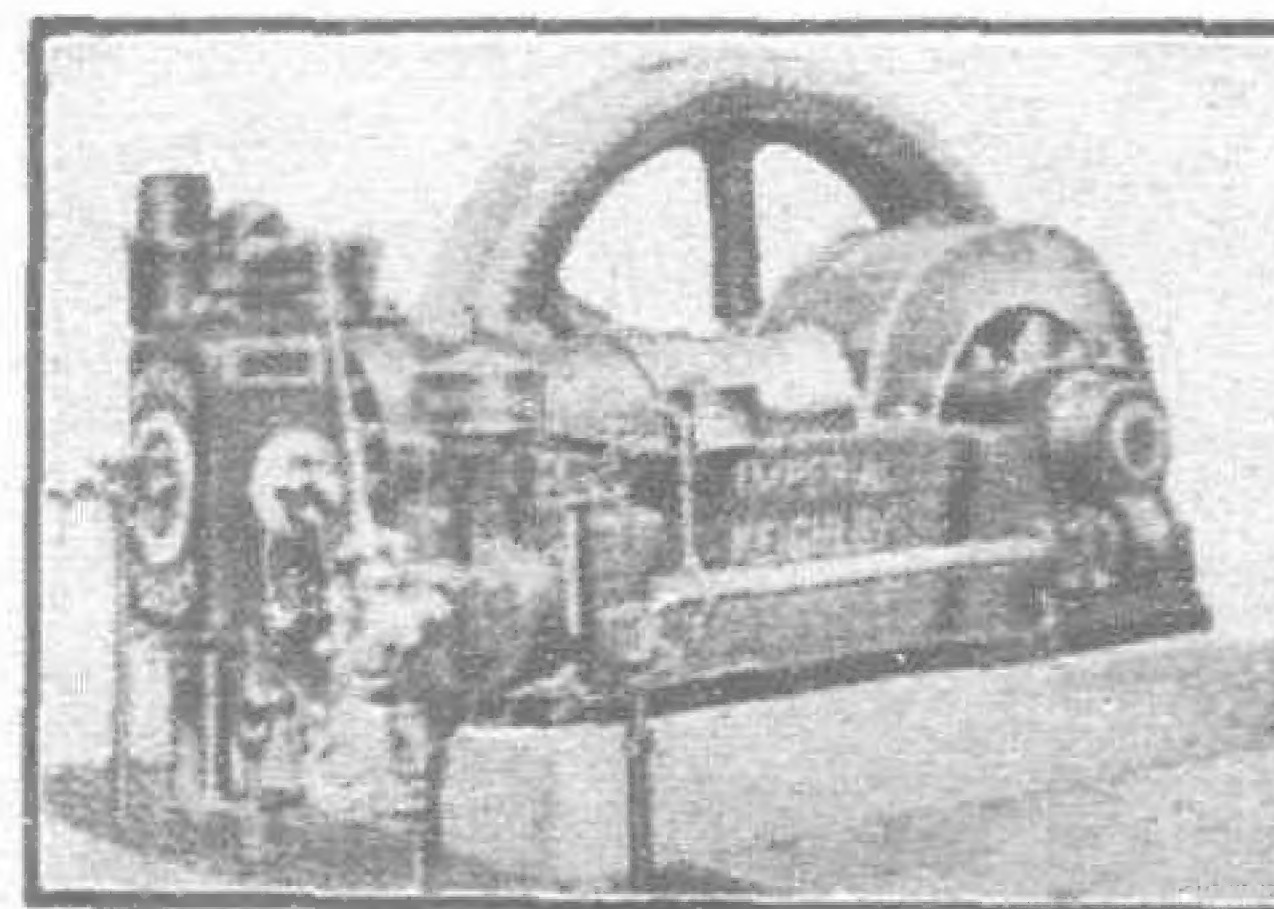
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